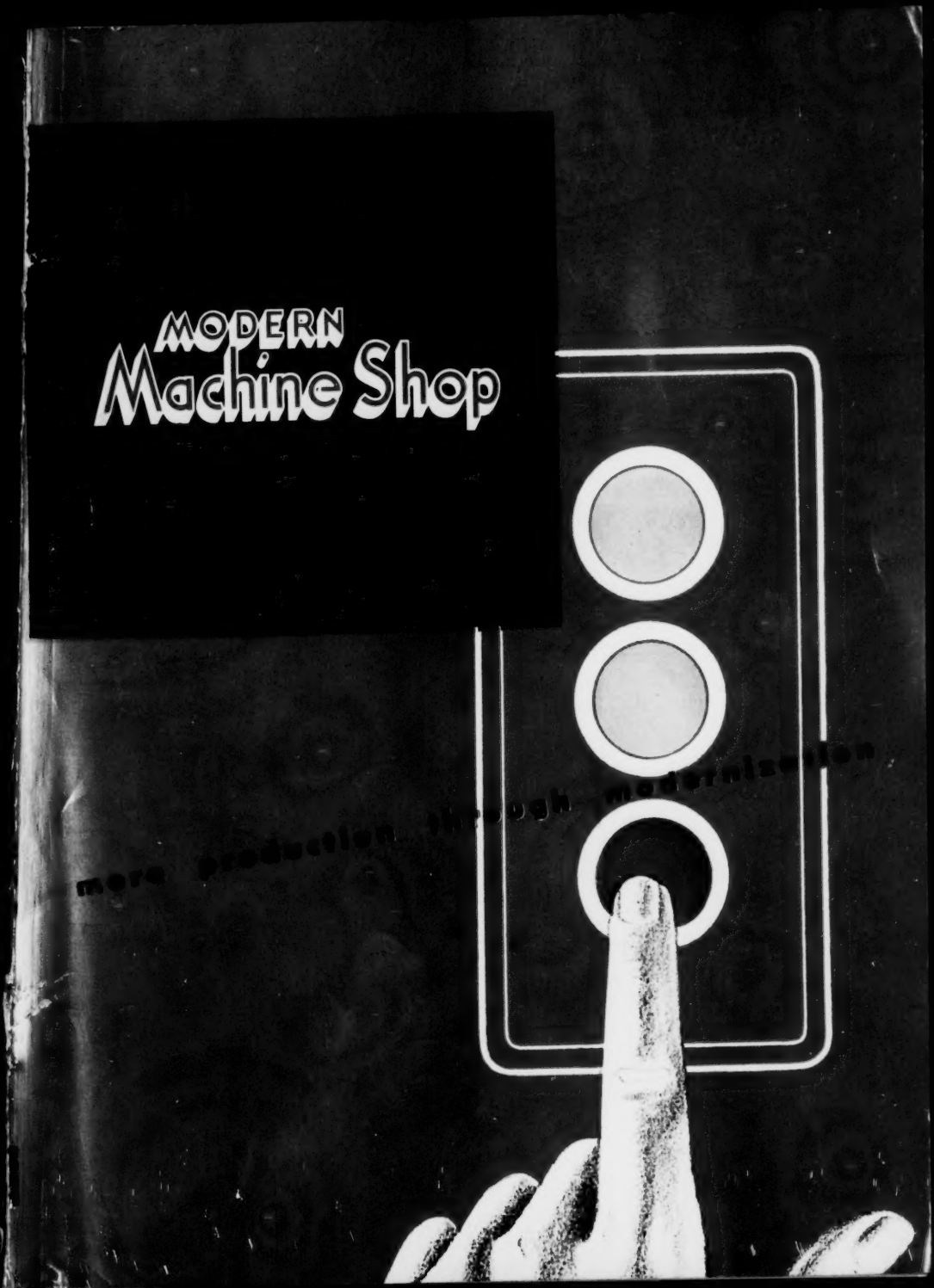
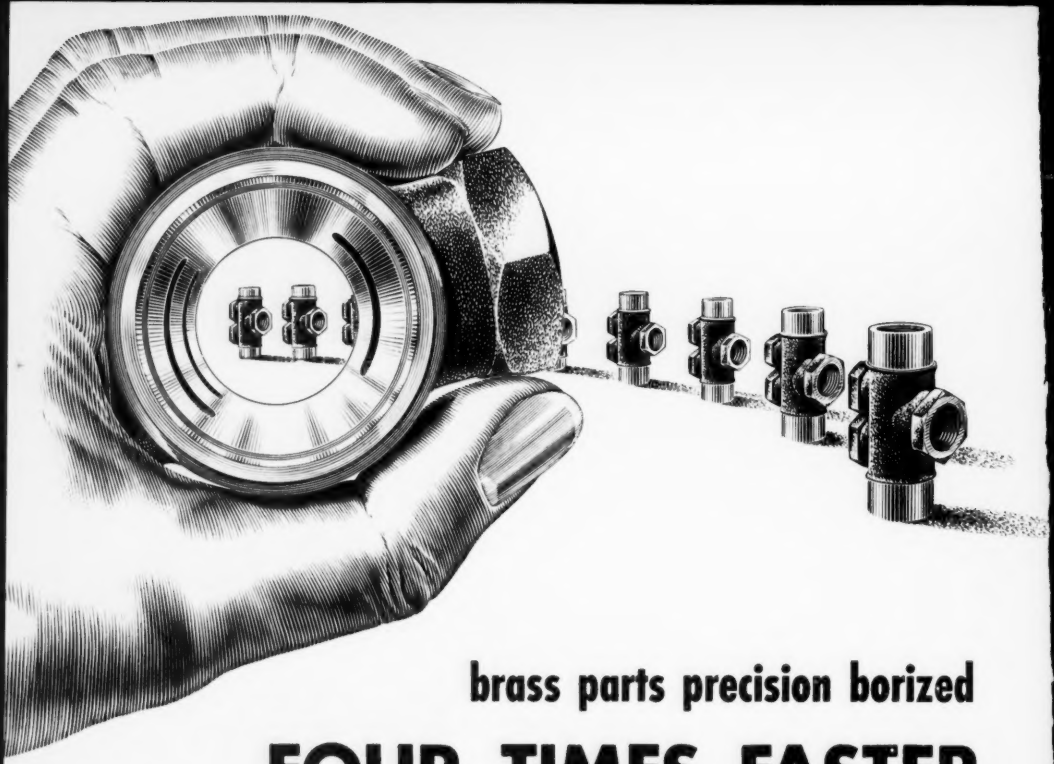
MODERN Machine Shop





brass parts precision borized

FOUR TIMES FASTER

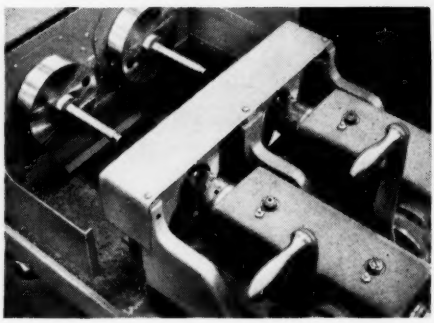
... with higher accuracy and better finish, too!

• No wonder this Heald customer is pleased.

Compared to the method previously used, his new Bore-Matic has multiplied air-valve production *four times!*

This one machine, a Model 124 Bore-Matic, finishes 15 different sizes and types of valve bodies. What's more, borizing of the rough-reamed parts produces a bore that's straight, round and within .0002" for size. Scrap losses have dropped to the vanishing point. And the new machine is far easier to operate, requiring less operator training.

Remember – when it comes to precision finishing, it pays to come to Heald.



Internal and Rotary Surface Grinding Machines and Bore-Matics

HEALD

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New Machine Tool "Primer"

THE "WHAT" AND "WHY" OF YOUR INDUSTRY

Here's an interesting explanation of the various types of machine tools . . . what they do . . . and why they're important. It's written and illustrated in non-technical style so your wife, youngster or friends can understand it—get an idea of what you do in the metalworking industry.

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Published by the NATIONAL MACHINE TOOL BUILDERS ASSOCIATION 10525 Carnegie Ave. Cleveland 6, Ohio

mail this card today!

Yes, I'd like to explain the importance of machine tools to my family and friends. Please send me_____copies of "Machine Tools, America's Muscles."

Name_____

Occupation_____

Home Address_____

City_____ Zone_____ State_____

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Work with machine tools . . .
Build machine tools . . .
Buy or sell machine tools . . .

You will be interested in this new educational booklet published by the National Machine Tool Builders' Association. In words designed for the layman, it describes what machine tools are and what they do, tells what machines have done for mankind over the years and makes clear their relation to increased employment and a rising standard of living.

Use the handy card below to request your copy or copies, while the supply lasts. No postage required.

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MODERN Machine Shop

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Published monthly and copyrighted (1953) by

Gardner Publications, Inc.
431 Main St., Cincinnati 2, Ohio

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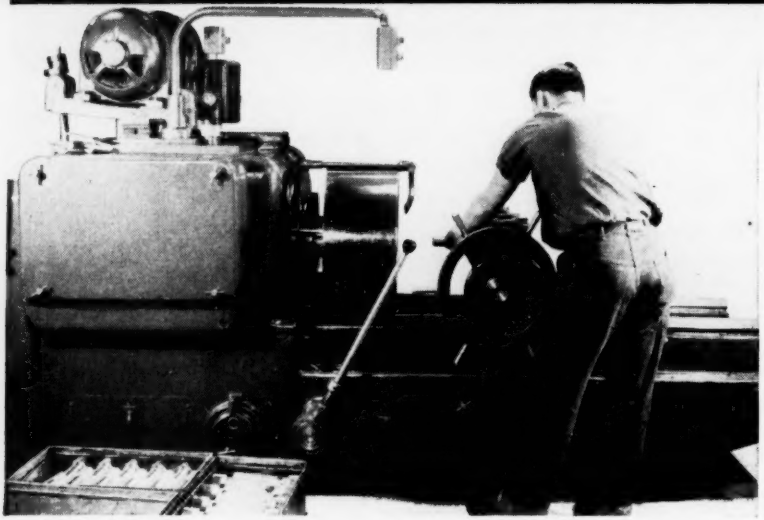
A NEW LANDMACO
for Cutting Large Diameter Threads



HARDENED and GROUND WAYS • WIDE SPEED RANGE
60% MORE GRIPPING POWER • 6" CAPACITY

A New LANDMACO Threading Machine has been developed for heavy-duty precision threading on large diameter work. This new LANDMACO is shown threading "Unbrako" socket head screws of TS4140 steel at the Standard Pressed Steel Company of Jenkintown, Pa. 1½" diameter 12 pitch UN threads are being cut 2-29/32" long to a Class 3 fit.

The carriage front, based on a new principle, assures proper work alignment under gripping pressure and gives 60% more gripping efficiency. Heavy hardened and ground rectangular ways firmly guide and support the carriage. A single gear shift lever is provided for a rapid speed change of 25% for any given spindle speed as determined by the speed change gears in use. Three pairs of speed change gears provide twelve spindle speeds ranging from 9 to 152 revolutions per minute. This machine is equipped with the 4" Standard Rotary Head or the new 6" (6-chaser) Lanco Head. It will cut bolt threads from 1½" to 6⅝" in diameter, and pipe threads from 1" to 6" in diameter. Maximum thread length is 29" with leadscrew and 30" without. Write for Bulletin #H-45. 382

LANDIS *Machine* CO. 50TH ANNIVERSARY 1903 1953 WAYNESBORO PENNSYLVANIA

NEW

CARBIDE TOOL FINISHING METHOD

Hammond CARBIDE BELT FINISHER

NOW — it is possible to final-finish single-point carbide tools

Without **diamond wheels**
Without **highly skilled operators**

Here is a NEW METHOD AND NEW MACHINE which have been proved in actual production. The Hammond Model 454 Carbide Belt Finisher is for final finishing with an abrasive belt after rough grinding with a silicon carbide wheel. It features —

Model 454
Carbide Belt Finisher

TUNGSTEN CARBIDE FACED PLATEN

Permits finishing the end, top and side clearance angles of single point tools.

CONVENTIONAL TABLE

Nothing new for operators to learn. One setting for all size tools.

LOW COST INITIAL INVESTMENT

Using abrasive belts in place of diamond wheels means a low cost initial investment. Also *eliminates the risk of substantial loss due to damage to diamond wheels.*

"Seeing is Believing" "Clip" this ad to your letterhead. We will arrange for you to use one. No obligation.

Hammond Machinery Builders INC

1615 **DOUGLAS AVENUE** **KALAMAZOO, MICHIGAN**

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LOW COST methods for PERFORATING and NOTCHING SHEET METALS

Whistler *MAGNETIC* Dies at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.

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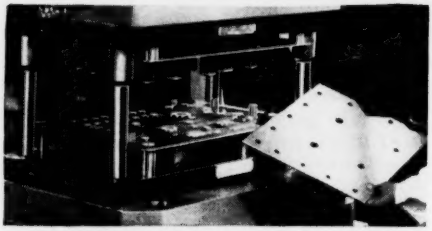
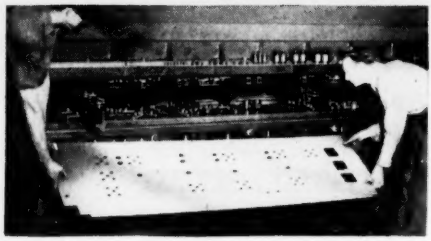
All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION**—*Down time is minutes as compared to hours for changeover.* For precision work in all types and sizes of presses. **START PRODUCTION AT ONCE.** Pierce materials up to ¼" thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.





● Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

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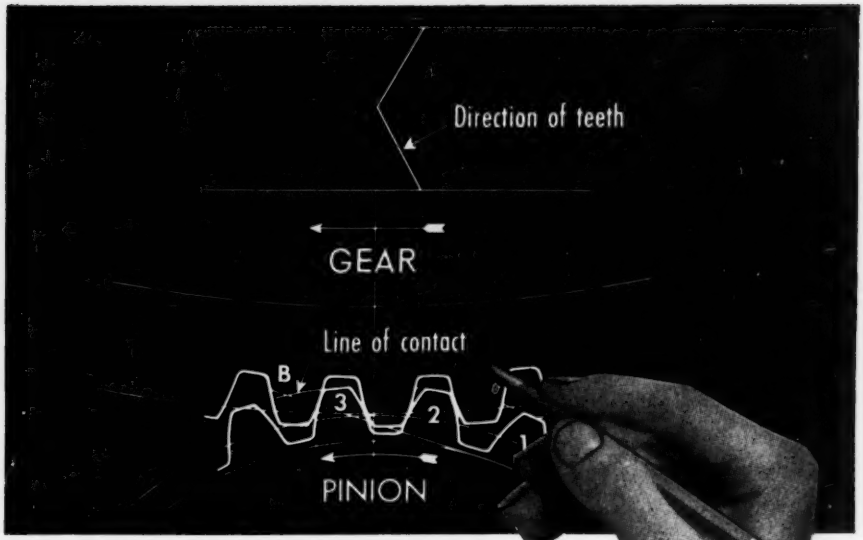

These might be called the "life lines" of a gear

These "life lines" are the lines of contact between a pair of Farrel-Sykes gears. Because they are oblique across the face of each tooth, and the pressure is evenly distributed from tip to working depth line, there is no tendency for the teeth to wear unevenly. This is why Farrel-Sykes gears continue to operate smoothly after so many years of service.

The quiet, vibration-free performance of these gears results from the accuracy of tooth spacing, profile and helix angle, and other qualities inherent in the Farrel-Sykes method of gear generation. Precision manufacture and the use of highest grade materials also contribute to long gear life.

Farrel engineers are available to assist in working out unusual gear problems. Write for further information.

FB-856

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ANSONIA, CONNECTICUT

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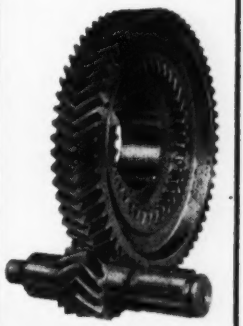
Sales Offices: Ansonia, Buffalo, New York, Boston, Akron, Detroit, Chicago, Memphis, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans

Farrel-Sykes herringbone gears are made in any size from ¼" to 20'0" diameter, for any power capacity and speed.



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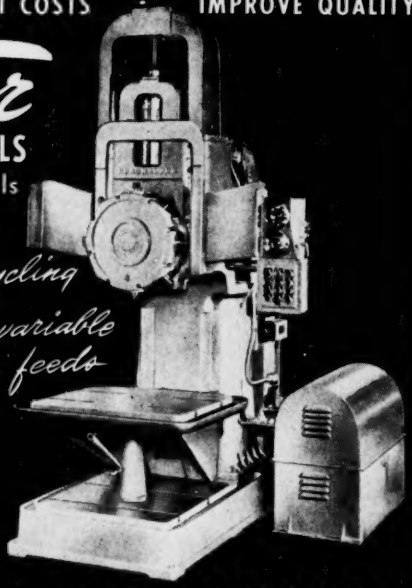
automatic cycling
infinitely variable preselective feeds

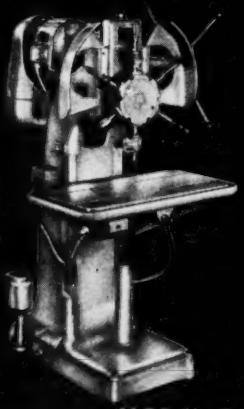
6 SPINDLE MODEL 2BH
AUTOMATIC • HYDRAULIC



8 SPINDLE MODEL 3BH
AUTOMATIC • HYDRAULIC

SPECIFICATIONS:

	MODEL 3BH	MODEL 2BH	MODEL 2A
Drill capacity, mild steel	1 1/4"	3/4"	3/4"
Ram travel	12"	8"	8"
Spindle speeds, preselective	12	12	12
Speed range	115-1700	225-3000	225-3000
Depth control	Preselective	Preselective	Preselective
Throat depth	19 1/2"	12"	12"
Table work surface	25"x 35"	17"x 34"	17"x 34"
Table travel	19"	19"	19"
Max. cl'rance, spindle to table	32"	23"	23"
Max. diameter tool clearance	9"	4 1/2"	4 1/2"
Motor, 2-speed, 1800/900	10/5 H.P.	2/1 H.P.	2/1 H.P.
Weight, approximate	7000 lbs.	2500 lbs.	1800 lbs.
Height	120"	78"	72"
Floor space, approximate	6'6"x 5'4"	60"x 51"	38"x 51"



6 SPINDLE MODEL 2A
MANUAL

WRITE TODAY FOR DETAILED INFORMATION

BURG TOOL MFG. CO. Dept. MM12

[illegible] DURANGO AVE. • LOS ANGELES 33, CALIFORNIA

GISHOLT'S *easier operation*

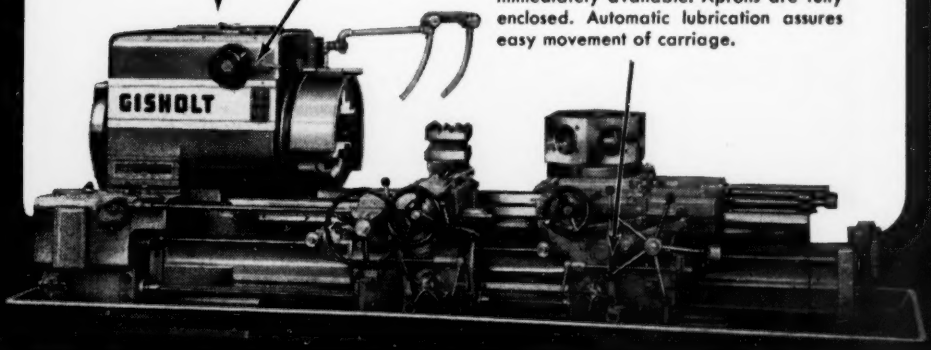
saves you time and money...

This 21,000 lb. machine requires no more operating effort than turret lathes ⅓ its weight. Despite its great power and rigidity for heavy-duty work, the new Gisholt 4-L is so fast and responsive, it can handle light work of both large and small diameters. With many machine functions entirely automatic, waste time is eliminated. Fatigue is reduced to a new minimum. Training time is shortened. Operator output is faster—more nearly constant throughout the day.

1 **Hydraulic Speed Selector** eliminates manual gear shifting. Spindle speed changes are made instantly by power without stopping the spindle or releasing the main drive clutch. Can be operated either direct or pre-set.

2 **Central control panel** eliminates manual effort. Provides responsive finger-tip, push-button control for start, stop, reverse, inching, chucking, and coolant supply. Automatic braking brings the work smoothly and quickly to rest.

3 **Easy selection of feeds** is provided in the new single dial type feed selector control, making a complete choice of feeds immediately available. Aprons are fully enclosed. Automatic lubrication assures easy movement of carriage.

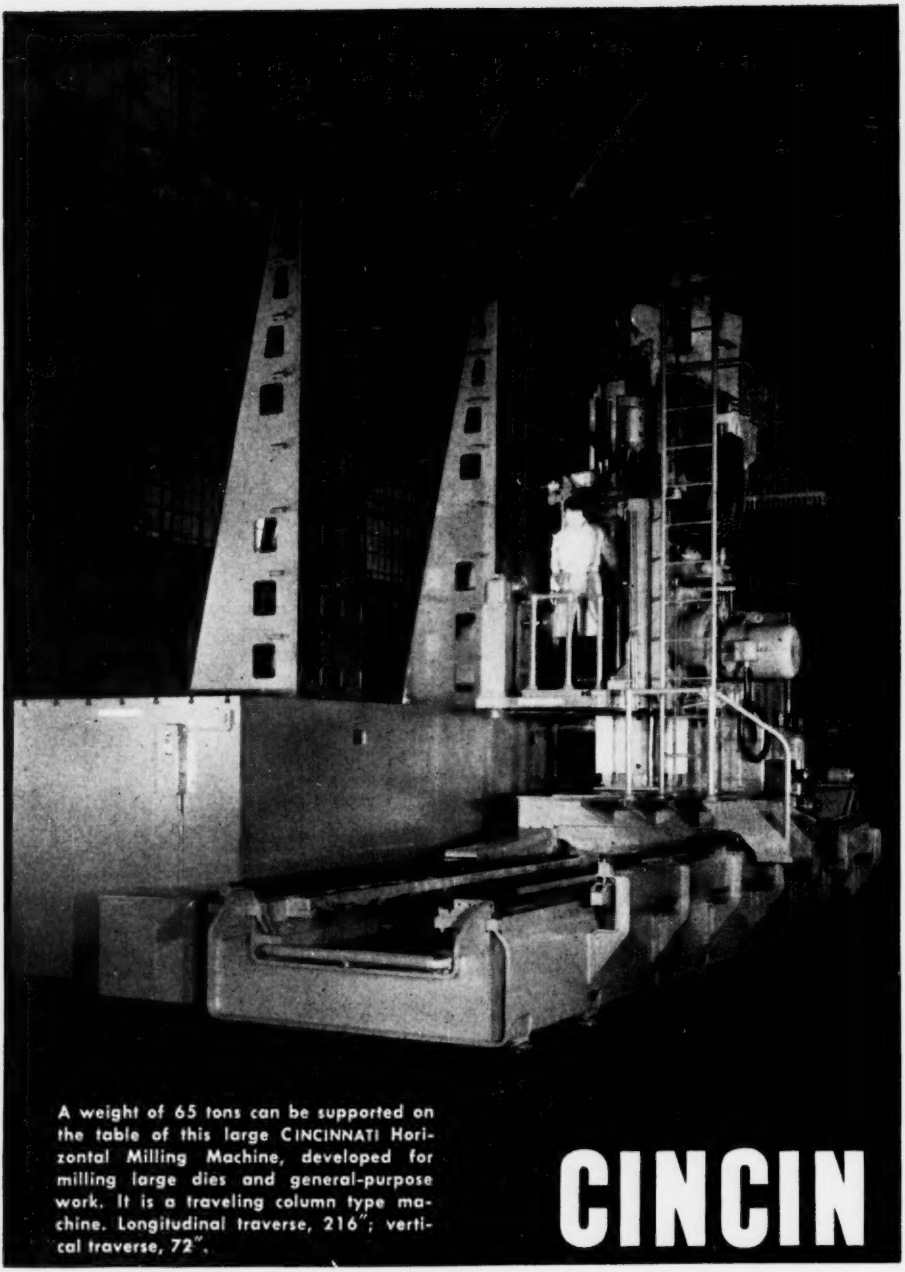


The new Gisholt 4-L Saddle Type Turret Lathe provides 31⅜″ swing over the ways, 27″ swing over carriage wing, 9½″ to 12½″ spindle bores and 63″ longitudinal working travel of turret carriage to accommodate an unusually wide range of work. Ask Gisholt engineers about this modern, easier operating Gisholt as applied to your specific machining requirements. New literature is available.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES



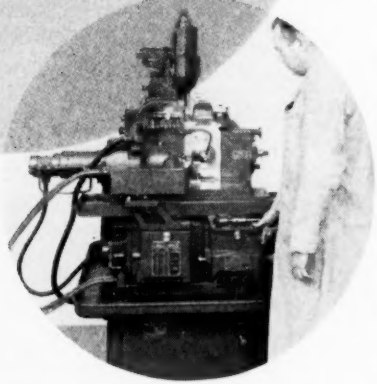
A weight of 65 tons can be supported on the table of this large CINCINNATI Horizontal Milling Machine, developed for milling large dies and general-purpose work. It is a traveling column type machine. Longitudinal traverse, 216"; vertical traverse, 72".

CINCIN

this familiar name plate

CINCINNATI

is attached to these extremes in milling machines



A range of 8" table travel and 2½" vertical travel on this CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine are just right for milling accurate hexagons on knockout punches. Production, 19 parts per hour. Visualized and tooled up by Cincinnati Application Engineers.

Elephants and rabbits* and all the in-between sizes of milling machines have been built by Cincinnati Milling for many years. The two machines illustrated here are indicative of the range of sizes. It takes long experience and extensive research and design facilities to build such a variety of machine tools. Cincinnati has this background . . . and these facilities. They are at your service to equip your shop for the lowest cost of production.

*Elephants are Washington terminology for long delivery, large machine tools; rabbits for short delivery, small machine tools.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO

NATI

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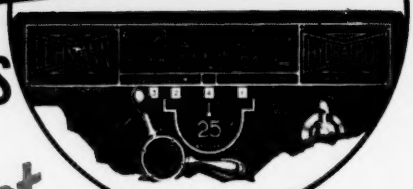
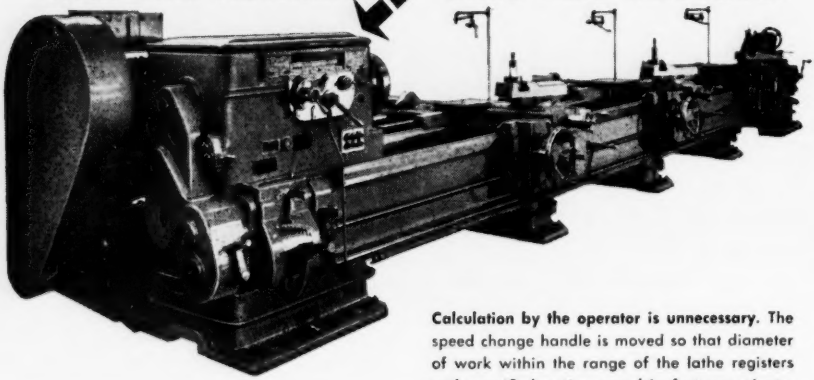
16 Spindle Speeds *with only a* Twist of the Wrist... *with This Automatic Slide Rule Selection!*





Just a turn of the hand wheel on the front of the headstock of the LEHMANN Hydratrol Lathe gives you a speed change! An automatic slide rule, co-ordinated with the movement of the handle, shows spindle revolutions per minute and indicates a slide rule calculation of the cutting speeds in feet per minute.

Calculation by the operator is unnecessary. The speed change handle is moved so that diameter of work within the range of the lathe registers with specified cutting speed in feet per minute, and the lathe automatically makes the necessary change.

The rotary selector gives 16 forward and 8 reverse speeds. No need for intermediate stop; unnecessary to disengage the friction driving clutch to change speed.

Check These Other Important Advantages:

- **Safe in operation.**
- **Simplicity in construction and operation.**
- **Hydraulic friction clutches and hydraulic brakes, self-compensating.**
- **Automatic safety relay, for harmless and easy engagement of positive clutches when speeds are changed.**
- **Spindle release for chucking.**
- **Perfect, safety-control lubrication with filtered oil.**
- **Gears constantly in mesh.**

Write today for additional information or catalog — or — send prints for time- and-money-saving recommendation!

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MACHINE COMPANY
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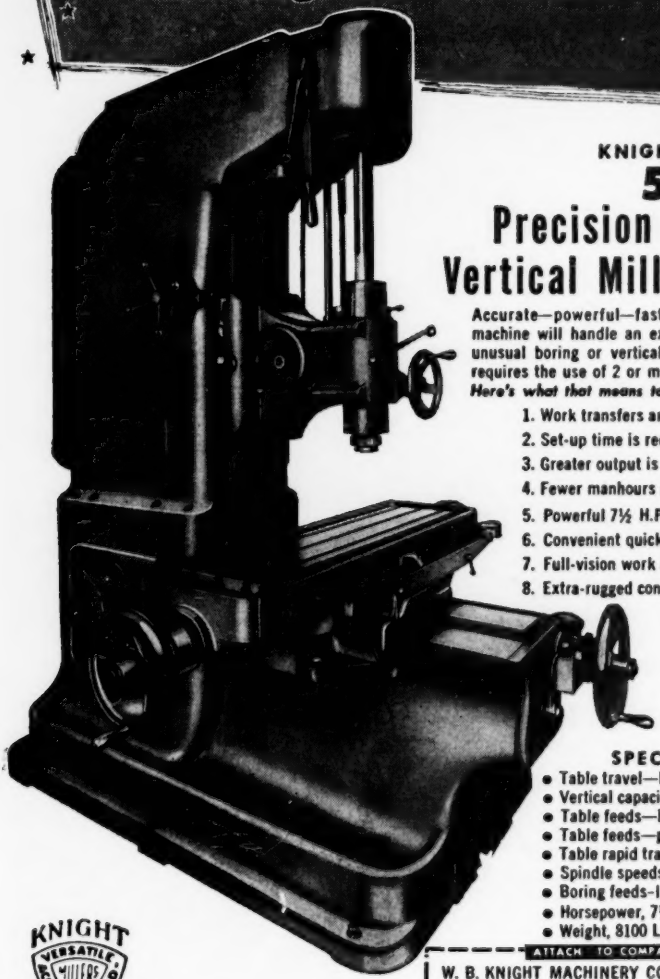
DIVISION OF NOVO ENGINE CO.

Precision Boring *plus* Milling On 1 Machine!



KNIGHT'S NO.

50

Precision Boring & Vertical Milling Machine

Accurate—powerful—fast—this versatile solid-base machine will handle an extreme range of difficult and unusual boring or vertical milling work that normally requires the use of 2 or more single-purpose machines. ***Here's what that means to you . . .***

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5. Powerful 7½ H.P. all-gear drive
6. Convenient quick-action controls
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8. Extra-rugged construction for long service

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SPECIFICATIONS

- Table travel—Longitudinal 28"; cross 18"
- Vertical capacity—28"
- Table feeds—Dial type, 16
- Table feeds—per minute, 5/16" to 20"
- Table rapid traverse—Both directions 100"
- Spindle speeds, 16—40—2000 R.P.M.
- Boring feeds—Infinitely variable, .0005"-.010"
- Horsepower, 7½.
- Weight, 8100 Lbs.

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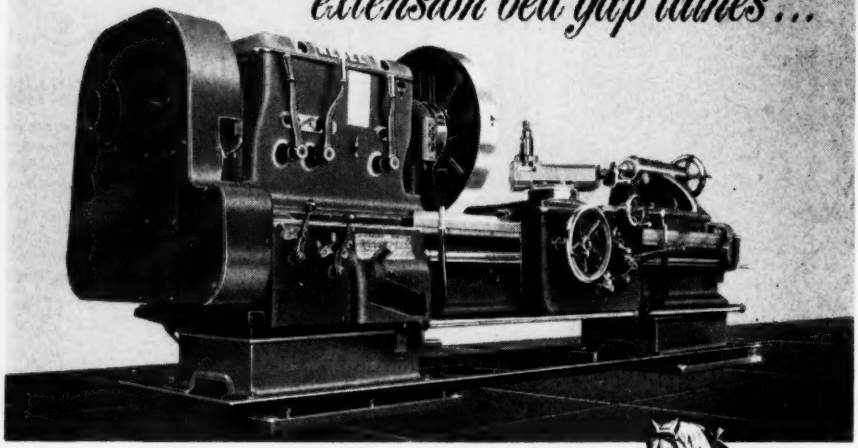
Name.....

Title.....

☐ Send information on Knight's 20" and 42" Rotary Tables.

Nebel

engine, removable block gap extension bed gap lathes...



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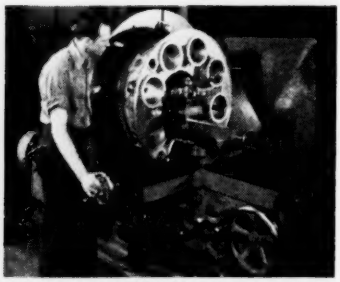
AND THAT'S REPRESENTATIVE OF the warm reception given Nebel lathes everywhere. They're basic, dependable, heavy duty lathes, built to do *big* work at *little* cost. A Nebel's a natural . . . truly the workhorse of the shop.

BUILT IN THREE MODELS: engine, removable block gap and extension bed gap . . . in swing sizes from 18" to 50". There's a size and type for your requirements, too.

Why not send for complete information today?

★ **THE NEBEL MACHINE TOOL CO., CINCINNATI 25, OHIO, U. S. A.**

Builders of fine lathes at modest cost since 1899.



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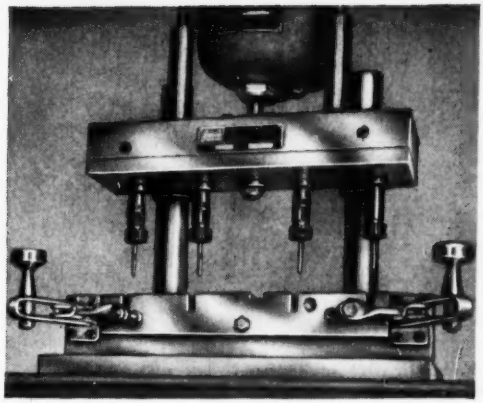
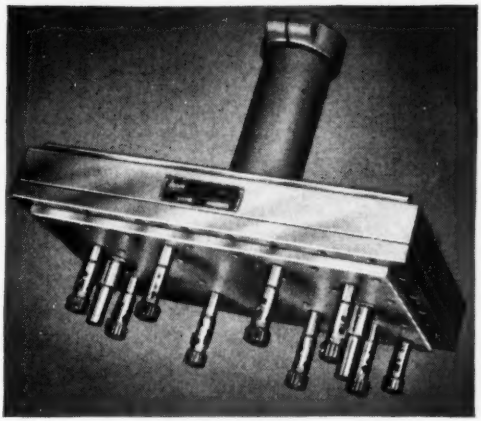
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

For Multiple Tapping and Drilling . . .



AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis MULTI-TAPPERS



Engineered and built to your specific production requirements from our basic standard components, Jarvis Multi-Tappers can be furnished for any type of drill press available.

We invite your inquiries—let us assist in analyzing your tapping and drilling needs!

Send for our catalog featuring Jarvis Multi-tappers

NEW FEATURES OF JARVIS MULTI-TAPPERS

include:

- Aluminum case—Jig bored.
- Gear driven—positive action, silent drive.
- Ball bearings throughout.

WHEN POWERED WITH A JARVIS TORQOMATIC DRIVE THE JARVIS MULTI-TAPPER PROVIDES THE MOST EFFICIENT AND PRODUCTIVE MACHINE IN THE FIELD.

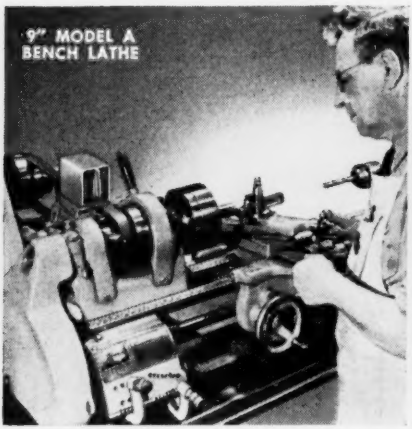
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

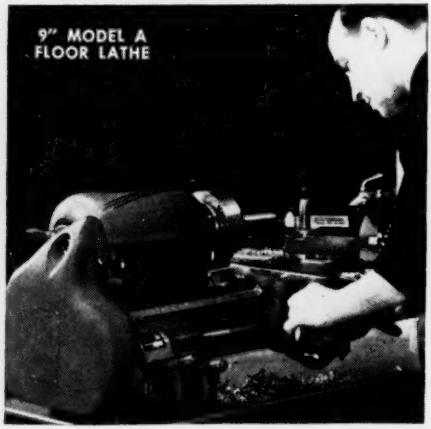
THE TURNING POINT FOR LOWER COSTS

Your turning point for lower machining costs can be found in South Bend 9" Lathes. They are exceptionally efficient on small, close-tolerance work. You'll also save on investment, power, tooling, maintenance, space and operators' energy.

You'll be surprised how busy you'll keep them. Their versatility permits a wide range of operations on a large variety of work. A large selection of attachments and tools is available to simplify tooling for routine and special operations.

There are Quick Change Gear, Toolroom, and Independent Change Gear models for every need. Contact your South Bend distributor or send coupon for literature.





PLEASE SEND INFORMATION CHECKED:

☐ _____

☐ TOOLS & ATTACHMENTS ☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ DRILL PRESSES ☐ TOOL GRINDERS ☐ ½" & 1" Collet TURRET LATHES ☐ 7" BENCH SHAPERS

Name _____ Company _____

Street _____ City & State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

Grind 360 Non-Parallel Edges of Jet Turbine Buckets per hour

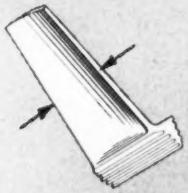
GARDNER
precision disc **Grinders**

Gardner method solves production problems

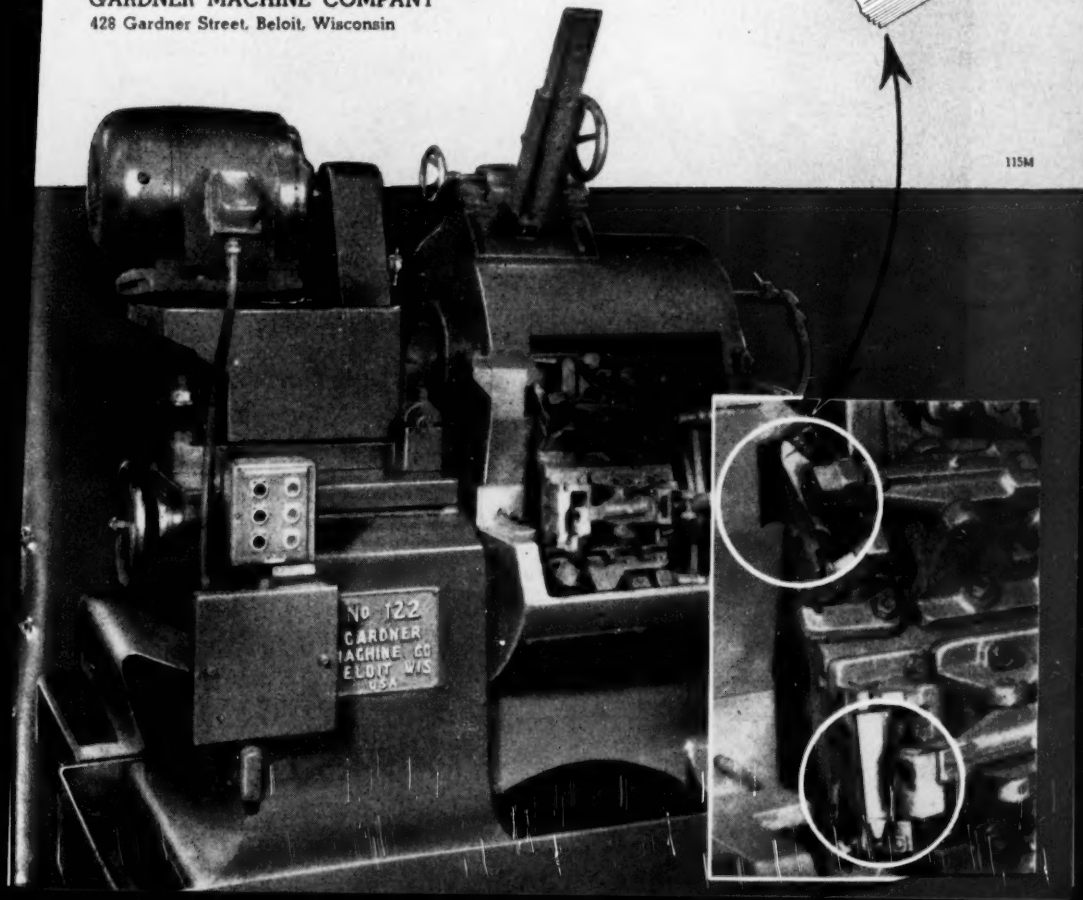
A Gardner No. 122-23" semi-automatic disc grinder gives this production by use of a rotary work carrier. Alternate fixtures permit grinding the two non-parallel edges. Each piece passes through the machine twice. Stock removal is 1/16" per surface.

For help on your flat surfacing problems consult Gardner.

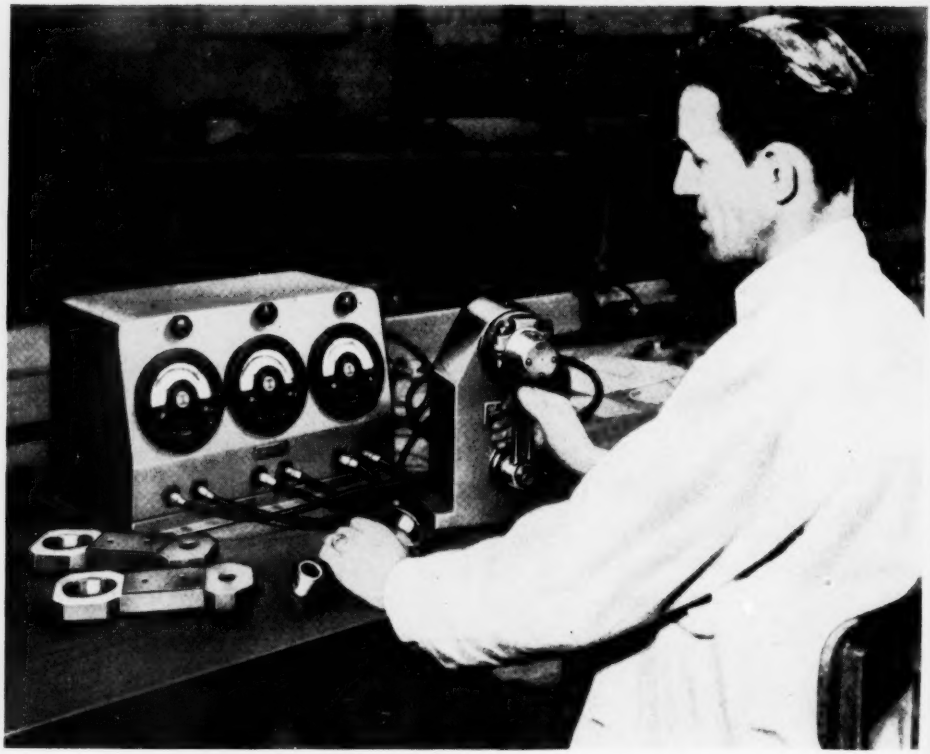
GARDNER MACHINE COMPANY
428 Gardner Street, Beloit, Wisconsin



115M



Only a Taft-Peirce *Offers these 4*



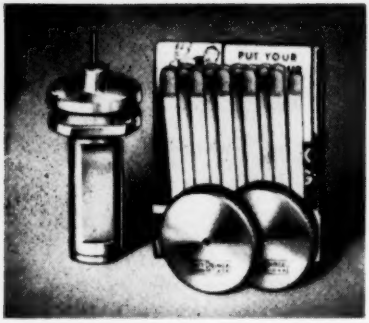
1 Computes Difficult Measurements Automatically

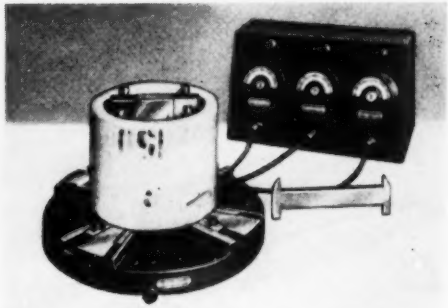
A T-P Computing CompAIRator eliminates the need for two measurements and a calculation. One gage, one dial, measures, calculates and indicates the final answer instantly on the dial face, for such difficult measurements as center distance without respect to hole size, deviation from angle or taper, concentricity, and squareness of bore to face.

The three dial Computing CompAIRator pictured above does the work of six dials in checking bend, twist, and center distance of connecting rods.

THE TAFT-PEIRCE MANUFACTURING

CompAIRator Air Gage
Great Features



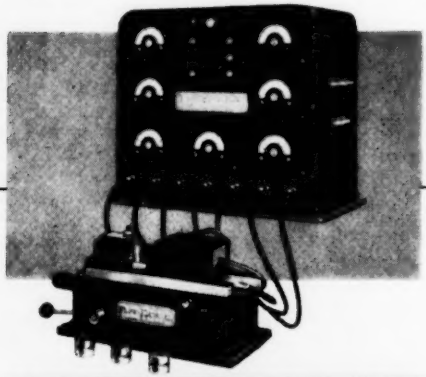


2 Checks Diameters as small as .055"

The velocity-type circuit of a T-P CompAIRator, which permits use of tiny air passages and nozzles, makes these small measurements possible quickly and accurately.

3 Checks Tolerances up to 120 thousandths

T-P CompAIRator air-contact members can be furnished to permit measurements within this wider tolerance range with a standard unit.



4 Gives Simultaneous Signal Light and Dial Indications

A T-P Air-Electric CompAIRator offers the ultimate in speed for multi-dimensional gaging. It provides both exact size on standard dials *and* light indications for oversize, undersize, and within tolerance conditions.

Couple these great features with the greater speed, accuracy, and dependability of a T-P CompAIRator — and you know why thousands use and prefer them. Write for demonstration at your plant. Prove the time and money saving differences for yourself.

T-P means Top Precision

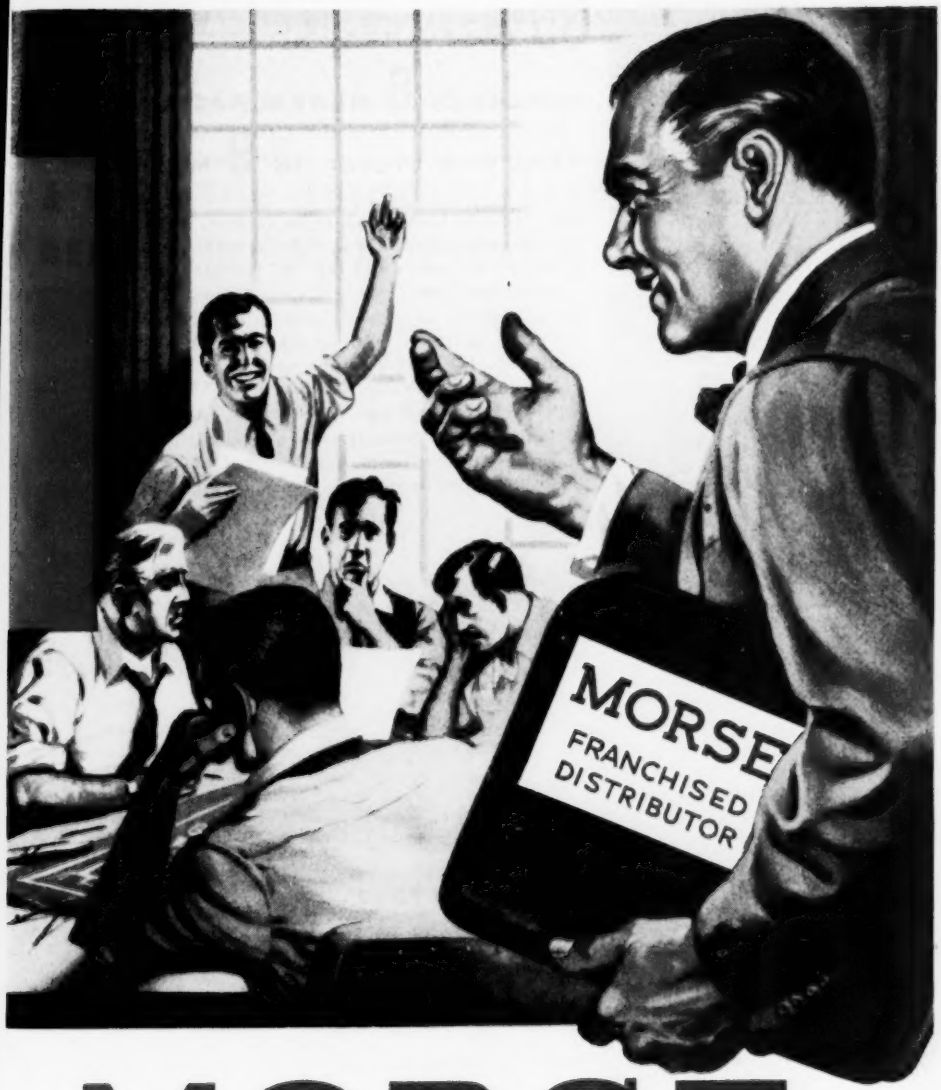
COMPANY, WOONSOCKET, RHODE ISLAND

Are You making full use of your "friend in time of need?"

He's no "fair-weather friend"— your Morse-Franchised Distributor. He's your *first aid* in time of trouble, when time's a-wasting. Whatever you need in Morse Cutting Tools, he's got it or can get it on the jump. And he knows his book on engineering these tools to your job. Yes, he's right on the spot to save you production time . . . not to mention purchasing and bookkeeping time, too.

So always call your Morse-Franchised Distributor for the best service on the best cutting tools made. Remember . . . *when he walks in the door, trouble flies out the window.*

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco



MORSE

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

35% SAVINGS IN LABOR

REPLACES 6 OLDER MACHINES

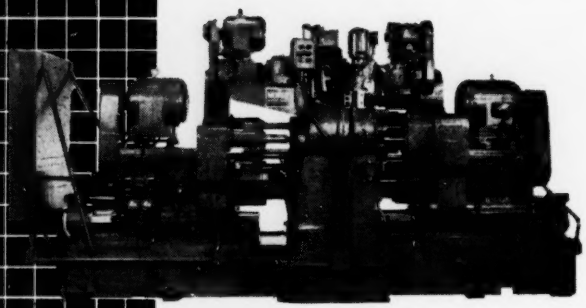
PAYS FOR ITSELF IN 9 MONTHS

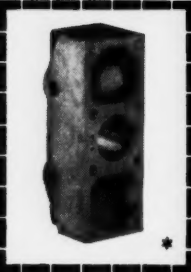
Another typical
Morris
MOR-SPEED
production machine
performance record

The two way horizontal, eight station, automatic indexing machine illustrated drills, reams, countersinks, forms radius and taps 187 refrigeration unit cylinders per hour.

This unit is equipped with nineteen drilling spindles, fourteen countersinking spindles, four counterboring spindles, one reaming spindle and eleven tapping spindles. Twenty spindles are in the left hand head and eighteen in right hand head.

If your work requires numerous operations on a mass production basis, consult us. Our engineers are eager to serve you.





OPERATIONS PERFORMED:

Drill, countersink and tap 8,—¼"—28 tap holes

Drill, ream and chamfer both ends of 1⅛" hole

Counterbore for ⅝" dia. segment

Drill, countersink and tap 1—½ tap hole

Drill, countersink and tap 2—⅜—24 tap holes

***Refrigeration Unit Cylinder**

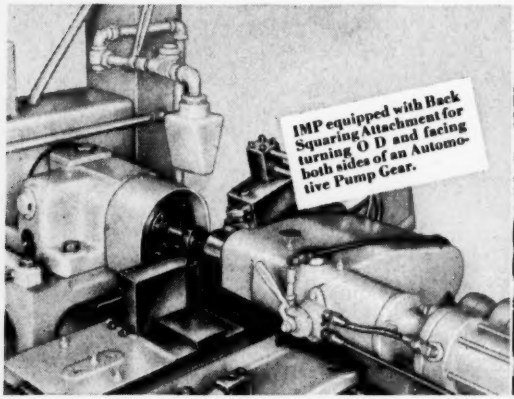
Morris **THE MORRIS MACHINE TOOL CO.**
934 Harriet St., Cincinnati 3, Ohio

a better product at less cost with precision plus production

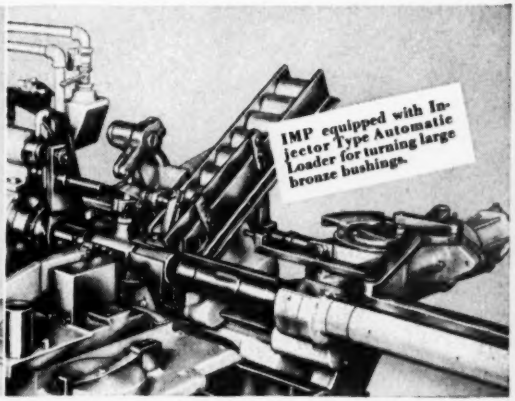
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

A VERSATILE AUTOMATIC LATHE FOR SMALL WORK DEMANDING HIGH SPEEDS & EXTREME ACCURACY

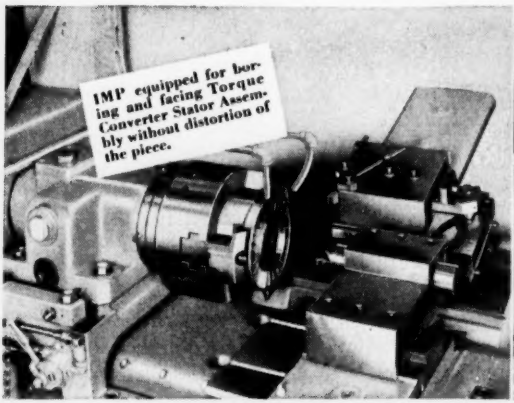


IMP equipped with Back Squaring Attachment for turning O D and facing both sides of an Automotive Pump Gear.

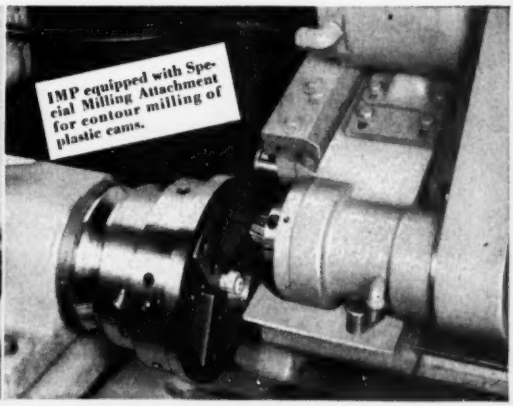


IMP equipped with Injector Type Automatic Loader for turning large bronze bushings.

THE Lo-swing IMP AUTOMATIC LATHE lends itself to practically unlimited tooling possibilities. The close-up views above and below show typical applications of standard and special attachments to the base machine which have resulted in increased production and lower costs. • If you have a production turning job requiring high speeds, fine finishes and extreme accuracy, write for Lo-swing IMP Bulletin No. N-50. Seneca Falls engineers will be glad to assist you with any of your turning problems. Your inquiries are invited.



IMP equipped for boring and facing Torque Converter Stator Assembly without distortion of the piece.

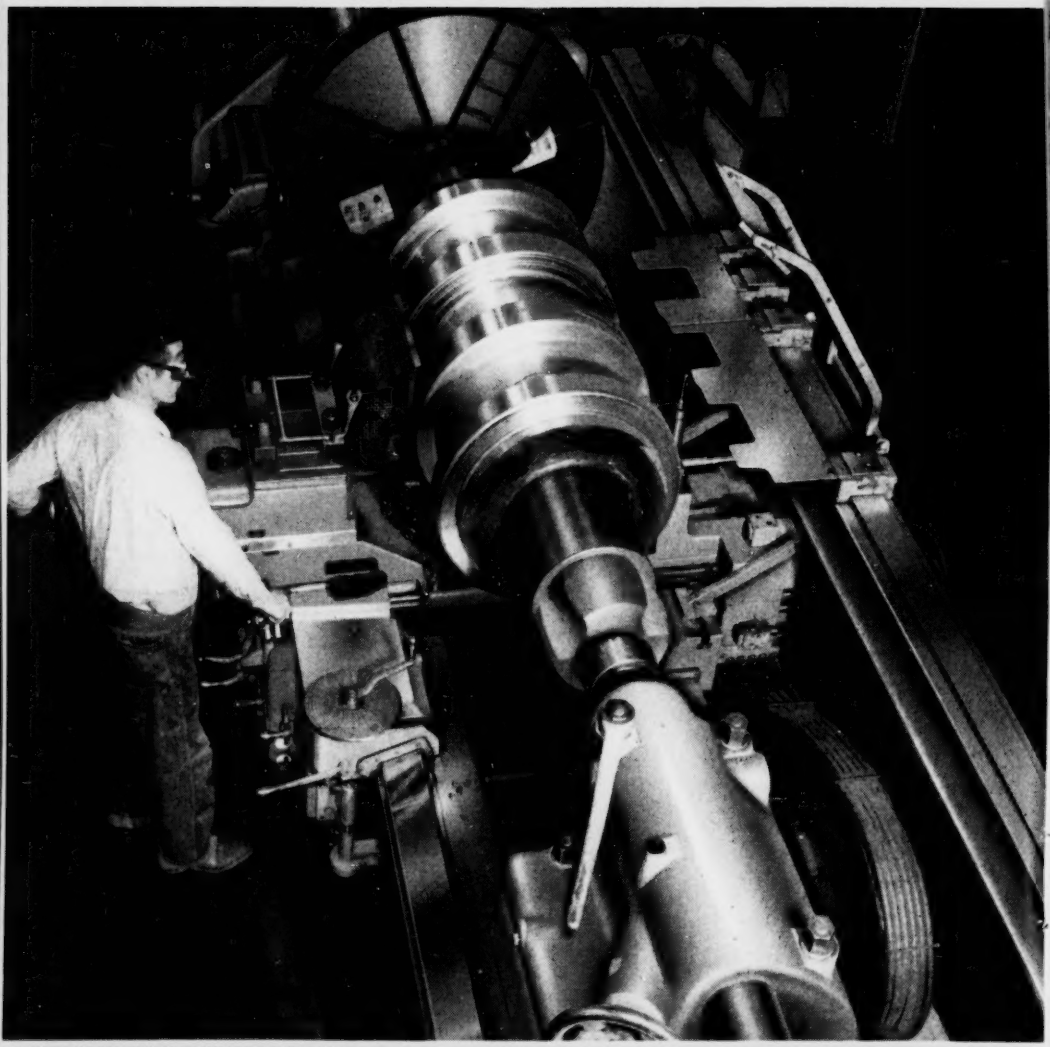


IMP equipped with Special Milling Attachment for contour milling of plastic cams.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

LeBlond Lathe eases cost squeeze ...on rolls that



A set of Shape rolls of 30½" dia. x 51" body cast alloy semi-steel are turned to .005" tolerance in 94 hours on this 50" LeBlond Roll Contouring Lathe. Set-up time ¼ hour. Clamped-on and brazed-on carbide tips are used at 48 rpm, .040 ipr feed. Conventional roll lathe took 245 hours for the same set of rolls.

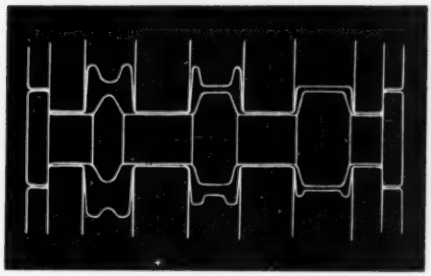
squeeze channels from blooms

U. S. Steel Lops 151 Hours Off 245-Hour Roll-Turning Job.

Every day at U. S. Steel's Clairton Works, Clairton, Pa., miles of "hotter-than-orange" steel are squeezed through the passes of rolls like these for reduction, elongation, shaping. They come out as finished structural steel for the "jungle-gym" frameworks of modern buildings. Turning these costly shape rolls with their steep-angle contours used to keep a lathe running *245 hours on a set of roughing rolls* at U. S. Steel. Tool life was short and the job required highly skilled operators. Stepped-up schedules called for a new solution to this tough-nut production problem.

A LeBlond 50" Roll Contouring Lathe, as recommended by Pittsburgh Distributor, Barney Machinery Co., immediately slashed the 245-hour turning time by an astonishing 61.7%. Now U. S. Steel *saves 151 hours on one set of roughing rolls*—more than enough time to turn out two more just like it. Tool life is greatly improved and less experienced operators can handle the work.

The 50" LeBlond Roll Contouring Lathe is equipped with two-directional hydraulic tracing. A single valve automatically controls two hydraulic motors for cross and length feed. A stylus follows a flat template mounted at the back of the lathe. Feed and speed can be varied during a cut without leaving a tool mark. For roughing, hydraulic cross feed can be by-passed and length feed used separately. This enables operator to cross feed manually, use template as length stop. Mechanical power rapid traverse to carriage and cross slide is also provided. All controls are located conveniently at the apron. The lathe uses a 40 constant horsepower DC motor, has nine speed changes in the headstock, delivers infinitely variable speeds from 1 to 165 rpm.



Typical roughing rolls for 8" channel

Whether your turning jobs involve specialized production like roll-turning, or call for high precision, high production—investigate LeBlond's complete line of 76 lathe models. LeBlond engineers will help you get a better turning job, faster. Write today or see your nearby LeBlond Distributor.

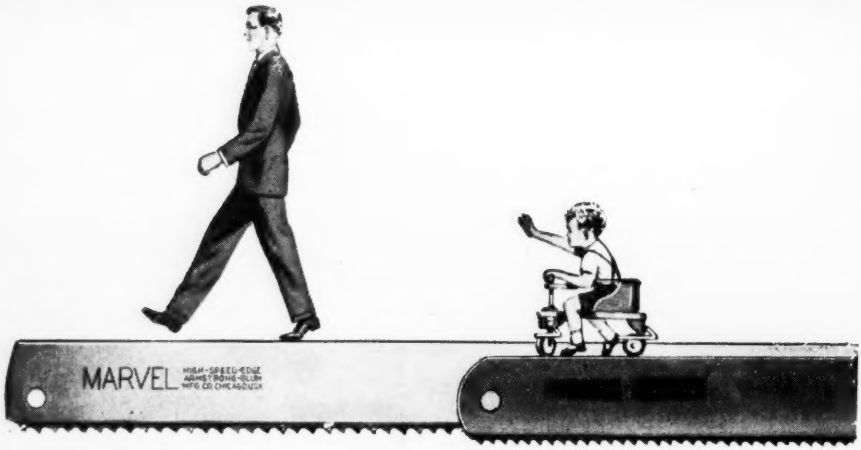
Ask for complete information on Roll Contouring Lathes in 25", 32", 40" and 50" sizes.

Turned faster by

LeBLOND *of Cincinnati*

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 66 YEARS*



. . . *but*
Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

MARVEL *Metal Cutting* **SAWS**
Better Machines–Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.

How Warner & Swasey Automatics cut costs for Thor Power Tool Company

Take a look at some of the typical time and cost savings delivered by Warner & Swasey 5-Spindle Automatic Bar Machines at Thor Power Tool Co., Aurora, Illinois

REDUCTION GEAR BLANKS

Savings pay for several new machines!

Large variety required—in lot sizes of 150-1500 pieces. Material: 8460 Steel.

Previous method: 2 single-spindle automatics, running continuously.

NOW – one Warner & Swasey 5-Spindle Automatic does complete machining in equivalent of 4 days a week.

DRIVE SHAFT IMPACT SPINDLES

Accuracy and rigidity deliver 4 to 1 savings!

Material: Super tough rivet set alloy, especially made for Thor.

Previous method: Roughed on single-spindle automatic, straddled to length on turret lathe—both machines running at half speed.

NOW—finished for grinding in single operation on Warner & Swasey 5-Spindle Automatic running at full speed.

THIN WALLED PROTECTION NUT

Combines operations at high removal rate!

Previous method: Three operations—rough turned, relief cut made in second operation, Class 3 threads hobbed in third. Cost of last step alone ran 20¢ per part.

NOW – finished in one operation in 132 seconds on Warner & Swasey 5-Spindle Automatic.

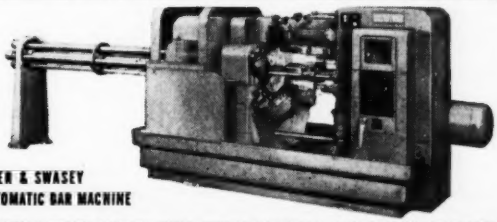
REDUCER BUSHING

Cuts Class 4 threads in same operation – costs reduced 8.5 to 1!

Previous method: Threads milled, following rough forming on single-spindle automatic.

NOW—Complete machining finished on Warner & Swasey 5-Spindle Automatic in one operation in 27 seconds!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880



WARNER & SWASEY
5-SPINDLE AUTOMATIC BAR MACHINE

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

SCULLY JONES

Arbors take heavy

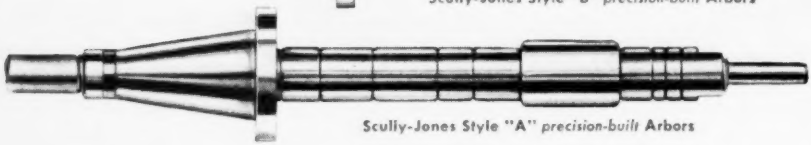
Rigidmils factory-equipped with Scully-Jones "Precision Holding" for accurate high production . . . long tool life!

Sundstrand Rigidmils are noted for accurate high production . . . power, heavy construction and adaptability to this *carbide age*. That's why many Rigidmils are factory-equipped with Scully-Jones *precision-built* Arbors . . . the arbors that save tool life and run true under fast, heavy cuts!

Scully-Jones Arbors give you more for your tooling dollar because arbor and pilot diameters are held to plus .0000", minus .0005". Faces of spacers and sleeves are ground parallel within .0002". This means cutters run true, each tooth taking its share of the load. Taper shanks have a finish of 10 to 20 micro-inch R. M. S., are individually checked on light gauges to guarantee a perfect fit and minimize run-out. They are built from high-quality forgings, properly heat treated to resist wear and eliminate vibration.

Add to this the low cost of tools produced in large quantities and you know why Scully-Jones Milling Arbors are the best buy for you! See your Scully-Jones Representative for complete information and prices.

Scully-Jones Style "B" *precision-built* Arbors



Scully-Jones Style "A" *precision-built* Arbors

STYLE "A" ARBORS with pilot end support permit clearance when small cutters are used for light work.

STYLE "B" ARBORS provide rigid setups, permit close coupling of dual overarm supports with cutters.

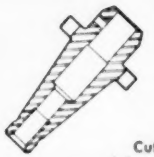
THERE'S A SCULLY-JONES PRECISION TOOL FOR EVERY HOLDING OR DRIVING NEED

Centering Plugs

For accurately centering face mills which bolt directly to spindle.

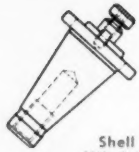
Collet Holders

For tanged taper collets and tools with Morse or Brown & Sharpe taper.



Cutter Adapters

Hold straight shank end mills, single- or double-end. Simplify tool changes.

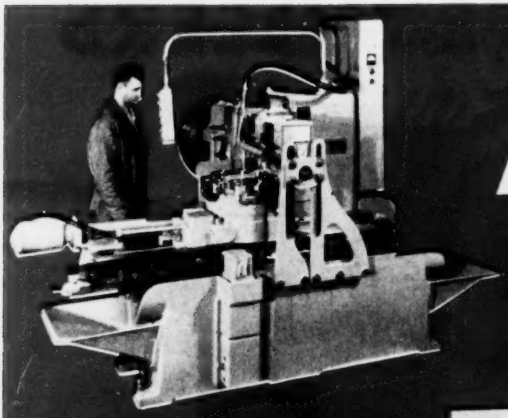


Shell End Mill Arbors

Style "C," shown, for machines having National Standard spindle end.

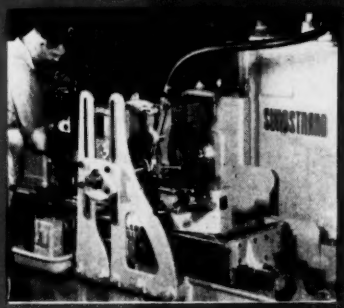
loads on Sundstrand *Rigidmils*

Standard Model 22 and 33 Rigidmils, manufactured by the Sundstrand Machine Tool Company, Rockford, Ill., exemplify modern high-production milling. Scully-Jones *precision-built* Arbors meet high-quality standards of Sundstrand's *engineered production.*

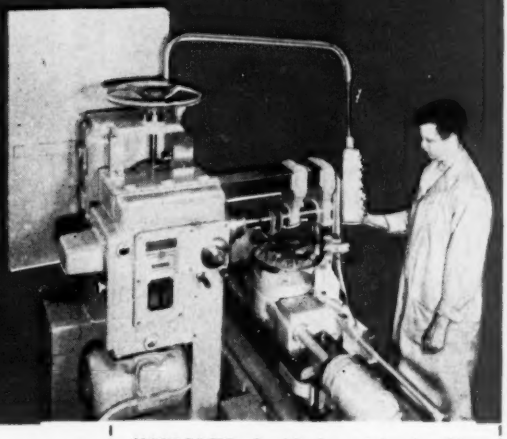


Producing 120 steel nozzle plates per hour, Model 33 Sundstrand Rigidmil is equipped with Scully-Jones 1½" Style "B" Arbor for driving twelve 4½" high-speed steel side mills.

Straddle milling lugs of cast iron clutch plates at rate of 54 per hour, Sundstrand Model 22 Rigidmil is equipped with Scully-Jones Style "B" 1½" Arbor for 6" dia. C. T. straddle mills.



Tough steel forgings milled at rate of 46 per hour on Model 33 Rigidmil with special Scully-Jones Style "B" 2" to 1½" Step Arbor for driving C. T. and high-speed gang cutters.



SCULLY JONES

Precision Holding
FOR HOLDING PRECISION

Scully-Jones and Company
1909 South Rockwell Street, Chicago 8, Illinois

MORE FACTS—Send for free catalog describing Scully-Jones "Precision Holding" Tools. Paste coupon to letterhead or post card and mail today.

Gentlemen: I'm interested in learning more about Scully-Jones Tools.

☐ Please send Bulletin 2-50 describing Milling Machine Arbors and Adapters.

☐ Send catalog describing your complete line.

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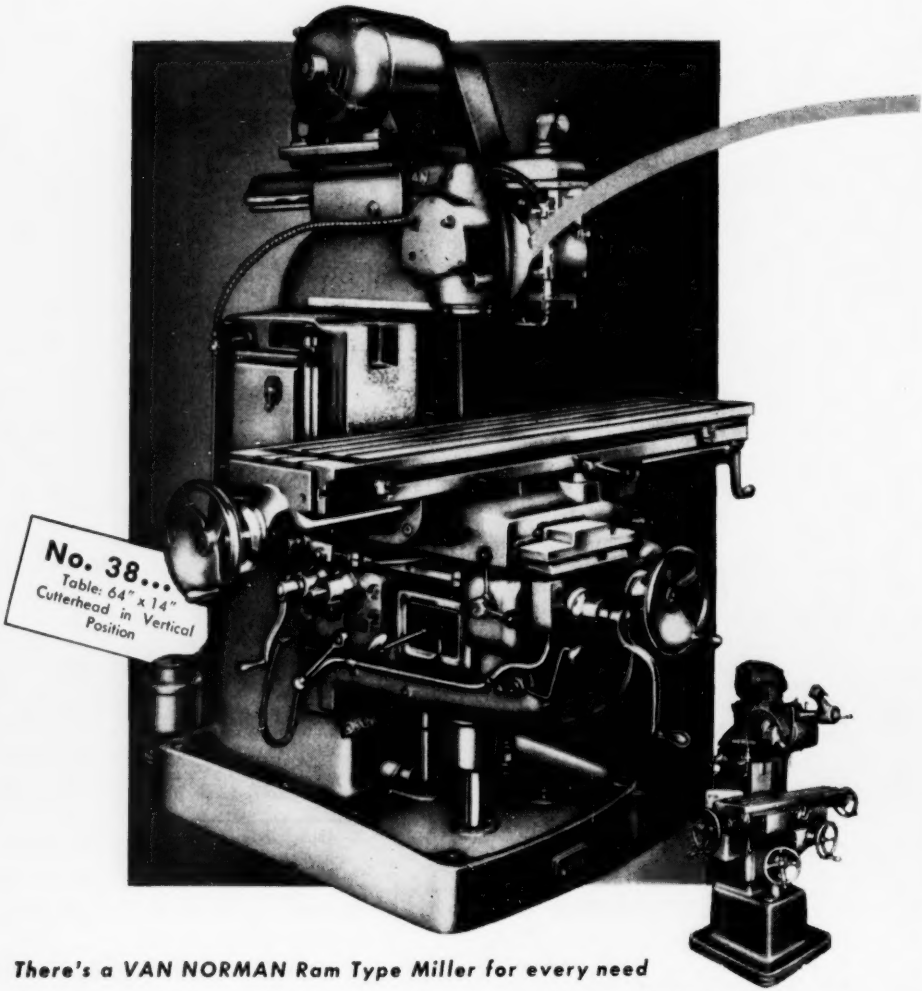
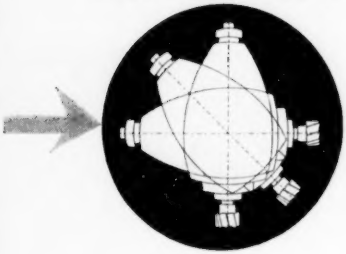
VAN NORMAN
RAM TYPE MILLERS



There's a VAN NORMAN Ram Type Miller for every need

No. 12 Table: 37½" x 9⅛"
Cutterhead in Angular Position

Eliminate Idle Machine Time up to 50%



The adjustable cutterhead meets all milling requirements... Horizontal, Angular, Vertical... with ONE Miller

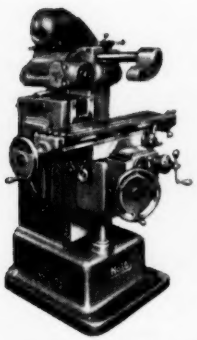
The versatility of the Van Norman ram-type milling machines provides a greater work range than available on single purpose machines.

The adjustable cutterhead in combination with the movable ram enables you to perform conventional horizontal and vertical as well as angular milling. This feature reduces work setups and reduces idle machine and operator time by as much as 50% . . . increases productivity proportionately. In addition, front and rear directional controls of power feeds simplify operations . . . cut operator fatigue.

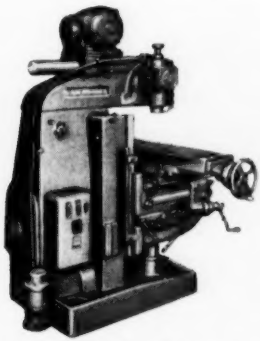
The Van Norman ram-type millers are ideal for use in the tool room, job shop, pattern shop, experimental laboratory, die and mold shop and for production work.

Because Van Norman Ram Type Millers enable you to meet all milling jobs, they keep operators and machines working. They cut costs, improve accuracy and increase production.

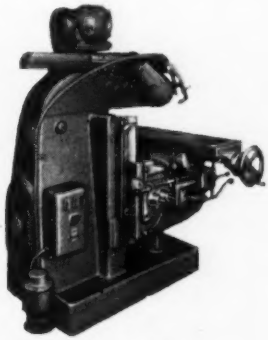
VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS, U. S. A.



No. 16 Table: 37" x 9½"
Cutterhead in Horizontal Position



No. 22L Table: 45" x 10"
Cutterhead in Vertical Position



No. 26 Table: 58" x 13"
Cutterhead in Angular Position

NEW...COMPLETE LINE of
END MILLS by GO & GO

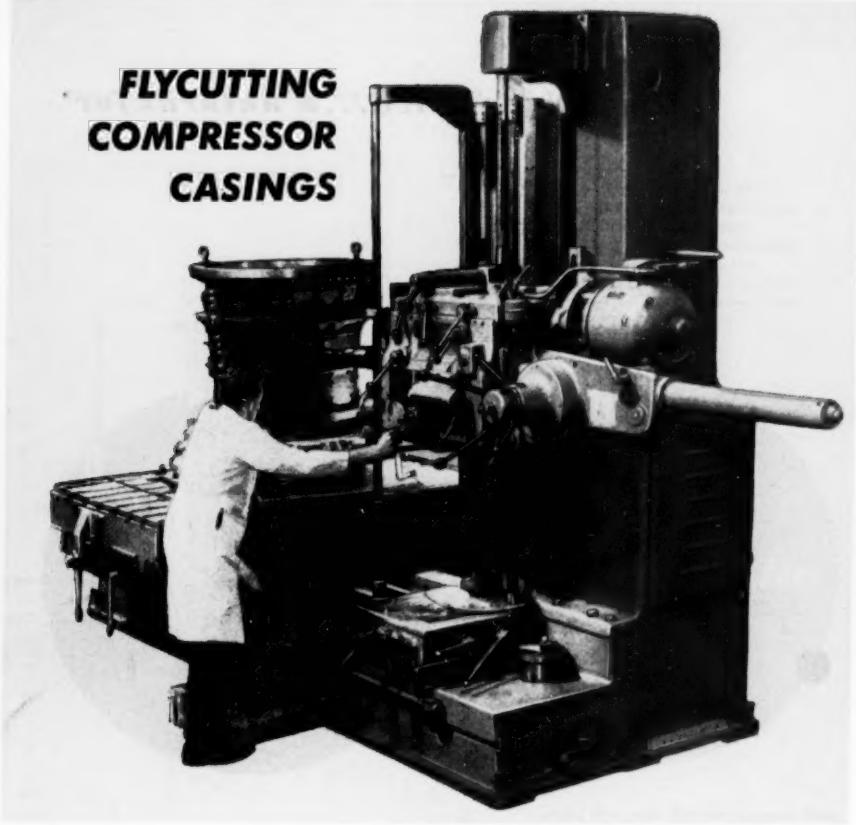
Send for Catalog

NOW you can get off-the-shelf delivery on end mills that GO & GO . . . New styles . . . Additional sizes . . . provide 149 stock end mills to meet ALL your end mill requirements. Long lengths, extra-long lengths, small diameters and 2″ dia. shank heavy duty end mills have been added to provide a complete range, as standardized by the Metal Cutting Tool Institute. The famous GO & GO quality is built into these tools. An ideal combination of high helix and curved undercut on the tooth face provides maximum effective shear plus long tool life. Write for new, convenient catalog covering all standard end mills and milling cutters.

GODDARD & GODDARD COMPANY

GO & GO

FLYCUTTING COMPRESSOR CASINGS



on the

ORENDA JET ENGINE

at A. V. Roe Canada, Ltd., Malton, Ont.

A total of ten Cincinnati Gilbert horizontal boring mills have been installed at A. V. Roe, and four more are on order. These fast modern machines fit the demand imposed by the Orenda Jet Engine production program: high production and accuracy in the extreme. They are delivering the kind of service that supports the statement: "Those who buy Gilbert buy Gilbert again."

Whatever your boring mill or radial drill requirements may be, you'll be well advised to investigate the productive capacity of Cincinnati Gilbert machines. Our representative is always at your service.

THE CINCINNATI

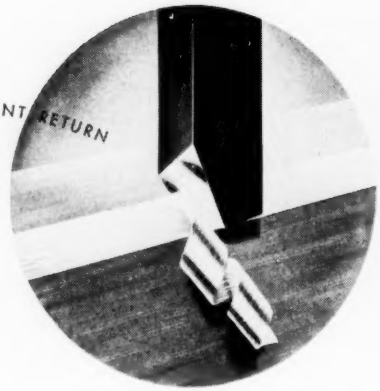
GILBERT

MACHINE TOOL COMPANY

3366 BEEKMAN STREET • CINCINNATI 13, OHIO

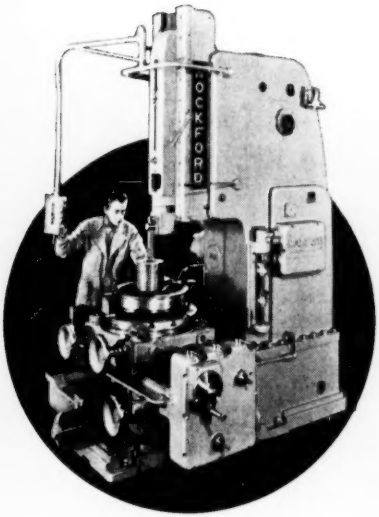
hydraulic drive...a natural for

CHECK-POINT OF MAXIMUM INVESTMENT RETURN



Rockford Machine Tool Co.

reciprocating machine tools



Hydraulic Drive and Feeds, as basic features in modern machine tool design, provide outstanding performance, measured in terms of work quality, high production and low operating cost.
We have had over 25 years of experience in applying Hydraulic Drives and Feeds to Shapers, Planers and Slotters.

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Powerful Hydraulic Fulcrum Drive to Ram
10° Tilt to Ram
Swiveling Tool Head
Pendant Controlled Cutting Speed Changes, infinitely variable.
Hydraulic Feeds in all Directions
Power Rapid Traverse in all Directions
Stroke Length Adjustment when Ram is in motion.
Dividing Head, Standard Equipment
Optional—Traveling Column for Greater Capacity

shaping / planing / duplicating / turning

our 51st year

Rockford, Illinois

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Boring Tools *by* LEHMANN *can:*

- **Put Accuracy, Utility and Economy into your Boring Operations**
- **Stop Costly Errors in Tool Setting**

That's right! The engineering staff and skilled machinists at LEHMANN can help you put efficiency and accuracy to work in your boring operations. Boring tools especially designed and engineered for your needs, help cut machining time to a minimum, give you accuracy, save you money! LEHMANN Boring Tools have been approved by industry for 35 years. Put LEHMANN'S experience to work for you.

Shown at right is a partial set of 36 boring bars especially designed for a large lathe manufacturer, by LEHMANN BORING TOOL for a re-tooling program on a new lathe headstock.

Tell us your boring problems without obligation or write today for CATALOG BT-12 to:

LEHMANN BORING TOOL

4389 Duncan Ave., St. Louis 10, Mo.

DIVISION NOVO ENGINE CO.

Rivett 918 "Steelway" Turret Lathe

Now you can produce small duplicate parts speedily in unlimited quantities with precision known only to the toolroom!

For here's a lathe that's been developed out of the bench class into a production machine. It has all the inherent precision for which Rivett has long been famous, plus time-saving features that reduce set-up and cutting operations to a fraction of that normally required. Single part production can be powered and cycled automatically.

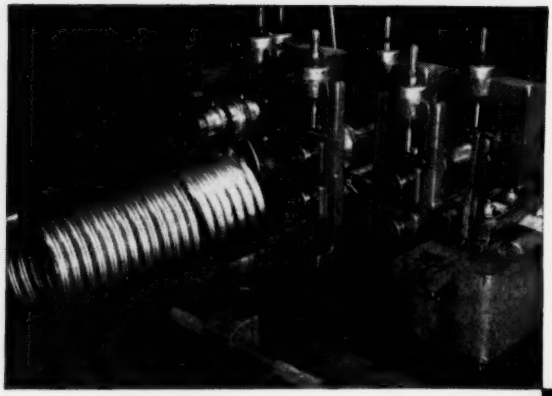
Any one of 120 to 3750 RPM cutting speeds may be instantly and accurately selected; newly designed collets increase speed of operation as well as accuracy and gripping power; automatic chuck closer and well grouped controls step up operator time.

Bulletin 918ST will give you all the details. Write for your copy today.

RIVETT **LATHE & GRINDER, Inc.**

Dept. MMSR-9, Brighton 35, Boston, Massachusetts

For More Precision Work RELY ON RIVETT LATHES AND GRINDERS, The Master Craftsman's Master Tools

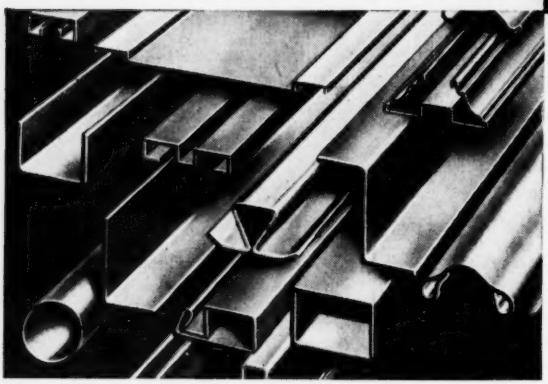


CURVING and coiling to almost any diameter, are two out of many operations which can be performed in a Yoder roll forming machine. As fast as formed, the sections can be continuously coiled and cut to length to make rings for auto hub caps, headlights, wheel trim, stator rings, etc., at a huge saving in cost of materials and labor.

Among other operations which can be tied in with cold roll forming may be

Curving Coiling and Ring Making

IN A COLD ROLL FORMING MACHINE



mentioned embossing, notching, perforating, welding, flattening, lock-seaming, filling and closing tubular shapes, wrapping, edge trimming, etc.

In the design and assembly of production lines of this character, the know-how of the Yoder engineering staff is at your service. The Yoder book on Cold Roll Forming deals broadly with the most important phases of the subject. Ask for it.

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Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS - cold forming and welding

ENGINEERING YODER MANUFACTURING

APEX - specialists in screwdriving

reach right into the tight spots

use an APEX extension . . . with APEX power bits

Apex extensions provide the extra length that makes it easy to drive screws in hard-to-reach places.

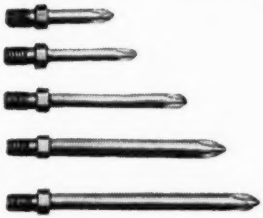
You can use them on any air, electric or spiral driver that accommodates ¼"-24 screw shank.

You can use them with any Apex ¼"-24 power bit or bit holder and insert bits.

You can use them in driving Phillips, Frearson (Reed & Prince), Slotted, Clutch Head, Socket Head (Allen type) or Hex Head screws.

In short, you can get the answer to just about any screwdriving problem from Apex. Write, on your company letterhead please, for your copy of our new Catalog 21 — the authority on screwdriving.

to drive PHILLIPS or FREARSON screws



to drive SLOTTED screws

to drive CLUTCH HEAD screws

to drive HEX HEAD screws

. . . with APEX bit holder and insert bits

APEX TOOLS

power bits, bit holders and insert bits

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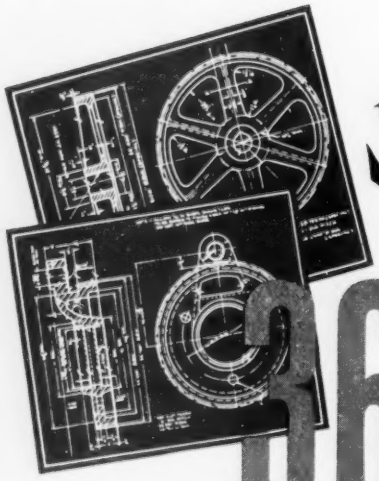
1027 S. Patterson Blvd. • Dayton 2, Ohio

Power Bits, Insert Bits and Bit Holders, for Phillips, Frearson (Reed & Prince), Slotted, Clutch Head and Socket Head Screws • Hand Drivers for Phillips, Frearson and Clutch Head Screws • Two-Piece Drivers for Hex Head Screws • Sockets, Extensions, Adapters and Nut Setters • Universal Sockets, Extension Wrenches and Adapters • Aircraft and Industrial Universal Joints • Self-Releasing and Adjustable Stud Setters • Safety Friction Tapping Chucks • Vertical Float Tapping Chucks.



From here to finished

36 Type Gear Shaper Cuts Production Time

Fewer Machines... Greater Accuracy... Lower Costs... these are the results in a plant where two modern 36-Type Fellows Gear Shapers are doing the work of *five* ordinary machines in cutting the spur gears specified in the production chart at the right... producing more work of greater accuracy and cutting operating costs into the bargain.

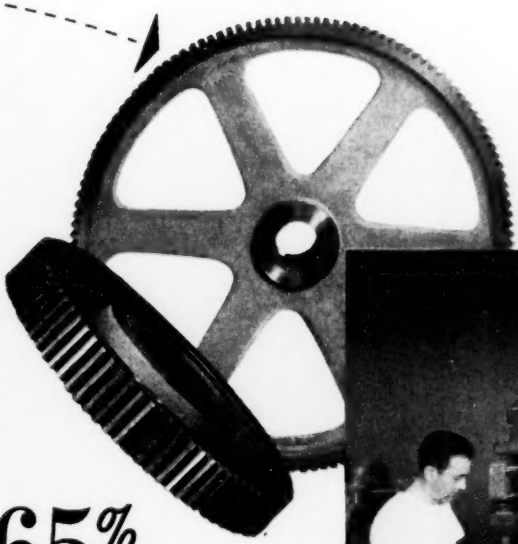
The 36-Type can be adapted to a wide range of work... spur or helical gears, external or internal, herringbone gears as shown in the illustration, splines, and irregular shapes of all sizes up to and including 36" pitch diameter and 6" face width. All these can be generated on this Gear Shaper by the Fellows Method.

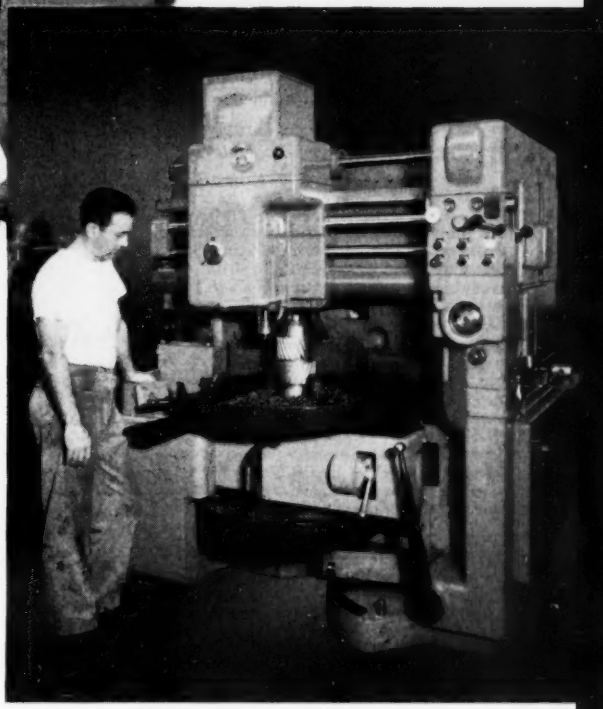
You can find out what the 36-Type Gear Shaper can do in your plant by talking with a Fellows Representative.

Fellows

The FELLOWS METHOD
...in action!

gear





By 65%

PRODUCTION PERFORMANCE

LARGE BRONZE SPUR GEAR (TOP)

Material . . . . . High tensile bronze #3
Face width . . . . 4 inches
Pitch diameter . . 34.000 inches (Special)
No. of teeth 138
Diametral pitch . 4
Production Time . 6 hours
Production Time with 36-Type Gear Shaper . . . 1 hr., 55 min.

STEEL SPUR GEAR

Material . . . . . Steel casting DW-19
Face width . . . . 3 inches
Pitch diameter . . 22.250 inches
No. of teeth 89
Diametral pitch . 4
Production Time . 10 hours
Production Time with 36-Type Gear Shaper . . . 2½ hours

GEAR SHAPER COMPANY

Head Office & Export Department: 78 River Street, Springfield, Vermont.
Branch Offices: 323 Fisher Building, Detroit 2 • 5835 West North Ave., Chicago 39.
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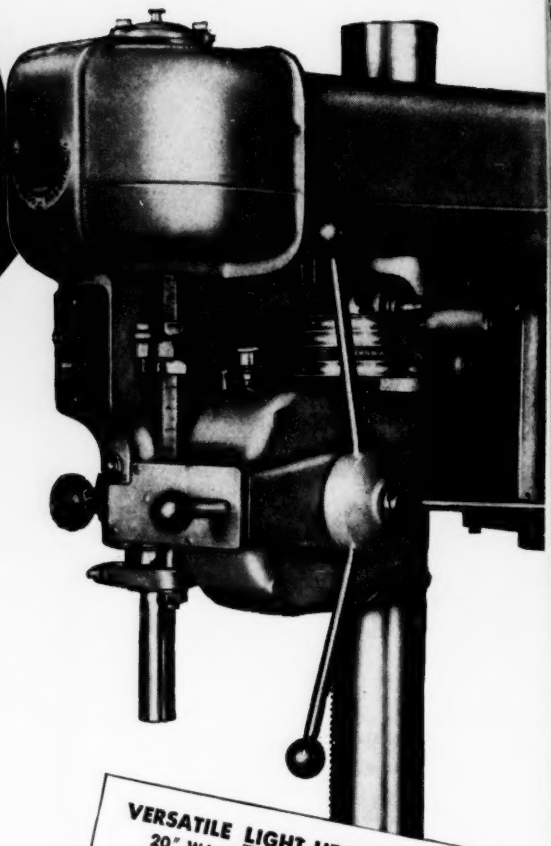
It's no accident that

they're known as *LIGHT-HEAVYWEIGHT* Drill Presses



It was done by design— WALKER-TURNER Design

For jobs where neither the capacity nor expense of a heavy industrial machine is warranted, and where a "hobby drill" would be wholly inadequate, Walker-Turner has engineered a special class of Light-heavyweight Drill Presses.

Professional in design and operation, yet light for production machines, this "in-between" line gives industry the needed capacity for short-run production work, without the necessity of heavy investment. Walker-Turner makes 15" and 20" Drill Presses (in Bench, Floor, and Production Models), as well as Radial Drills. For complete information, use margin below to write your name and address.

WALKER-TURNER
Walker-Turner
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

Drill Presses — Hand and Power Feed • Radial Drills
Wood and Metal Cutting Band Saws • Tilting Arbor Saws
Radial Saws • Jig Saws • Lathes • Spindle Shapers
Jointers • Belt and Disc Surfacers • Flexible Shaft Machines

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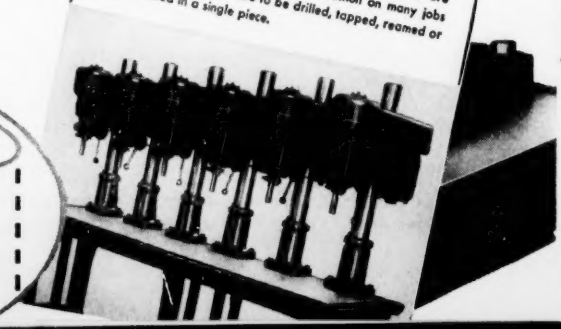
***TRAINED* INDUSTRIAL DISTRIBUTORS**

VERSATILE LIGHT-HEAVYWEIGHT
20" WALKER-TURNER DRILL PRESS
MULTIPLE-SPINDLE MODEL

Designed for industrial users where production rate and initial cost are primary factors in the selection of equipment, Walker-Turner 20" Drill Presses operate continuously and accurately at any rate of speed from 400 to 2600 r.p.m. Multiple spindle models (2 to any desired number) are particularly effective in increasing production on many jobs where a series of holes are to be drilled, tapped, reamed or counterbored in a single piece.



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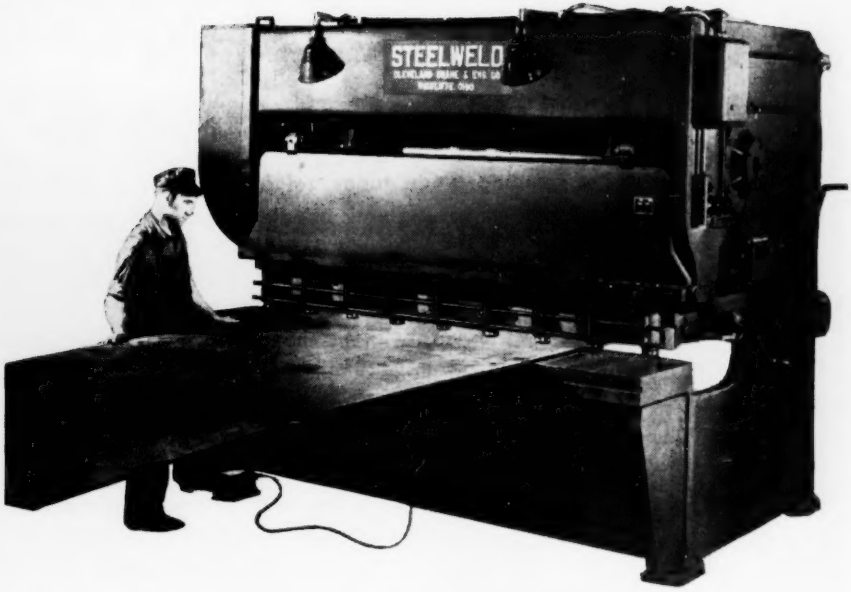
to write for full details and specifications
Walker-Turner Division, Kearney & Trecker Corp.
Dept. MM-9, Plainfield, N. J.
(Please write your name and address in margin of page)



ALL STEELWELD SHEARS
CONTROLLED ELECTRICALLY...

OPERATION of Steelweld Shears is unusually easy and convenient. There is no tiresome lifting of the leg to work a foot treadle. Slow, fatiguing knee action has been replaced by fast easy toe action.

A safety type electric foot switch is used. It can be slid around the floor wherever most convenient. It enables shearing speeds not attainable with foot treadles for certain cutting operations.

For instance, when cutting narrow strips from a long sheet, the operator can push the sheet at the end and control the shear at the same time. He need not be near the machine. As the sheet becomes shorter he can move the switch along with his foot to always be within easy reach.

There is no extra charge for electrical foot control on Steelweld Shears — it is standard equipment on all size machines.

Steelweld Shears are radically different from all other shears with many outstanding features. Get the facts on these truly new and modern machines. Learn about the advantages they offer you.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
6403 *EAST 282ND STREET* *WICKLIFFE, OHIO*

STEELWELD PIVOTED BLADE SHEARS

CUT COSTS WITH MULTIPLE BENDING

Whether you're bending pipes, tubes, reinforcing bars or structural shapes, you can greatly increase your bending production by multiple die bending.

Shown here is our Model A-5 BENDING MACHINE, tooled for bending 3 different radii without changing the set-up. In order to make multiple bending cost no more per die than single bending, individual dies are merely stacked on the die spindle and a shoe of the proper width permits the same degree to be bent without changing the automatic reset switch. The MODEL A-5 will bend pipe up to and including 2" standard weight pipe.

Redesigned and greatly improved, the Model A-5 still sells for only $1975. F.O.B. factory, U.S. Funds.

Smaller and larger machines available.

Write for detailed and descriptive folder.

PEDRICK TOOL & MACHINE CO.
3640 N. Lawrence St. Dept. 5,
Philadelphia 40, Pa., U.S.A.

Consider these 3 OUTSTANDING Advantages of SPRINGFIELD VERTICAL GRINDERS

ALL SLIDEWAYS ABOVE GRINDING WHEEL

protected from abrasive dust and grit . . . LONGER LIFE.

NO GRAVITATIONAL PULL

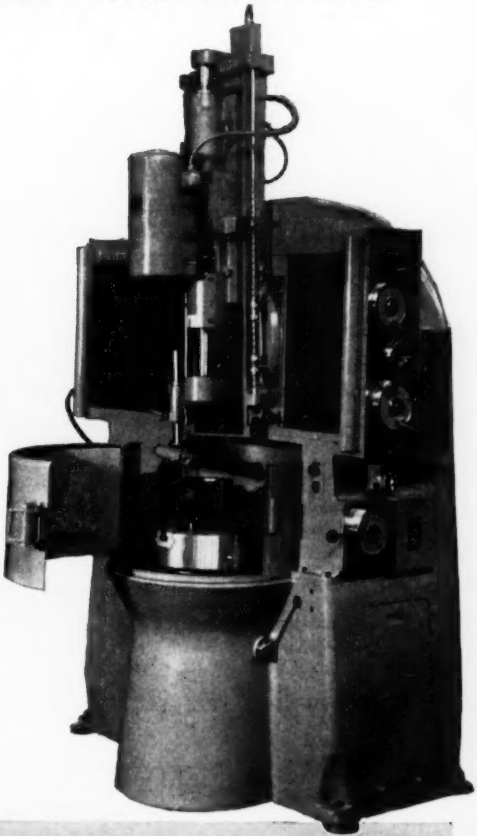
to throw work out of line. Work sets solidly on vertical spindle . . . GREATER ACCURACY.

EASE OF OPERATION

All controls conveniently located at normal height; greater work visibility; easier loading . . . HIGHER PRODUCTION.

PLUS the added advantage of GREATER VERSATILITY

Grind combinations of O.D., I.D., faces, tapers, shoulders or steps with one set-up. Hold extremely close related tolerances.



Springfield Vertical Grinders are thoroughly proved by 14 years of time-saving, cost-saving precision production. Various capacities to 42" swing x 24" hole depth.

Write for Catalog 183

THE SPRINGFIELD MACHINE TOOL COMPANY

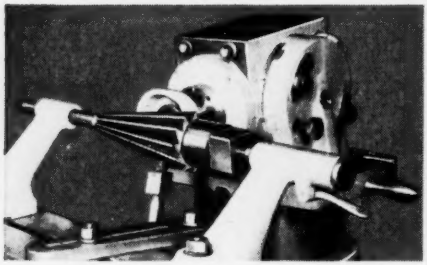
SPRINGFIELD, OHIO, U. S. A.

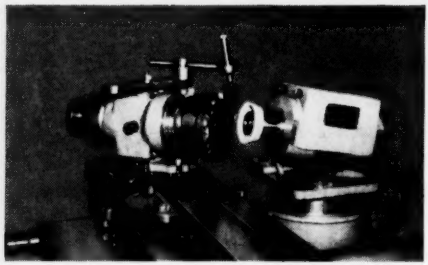
GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 640 W. WASHINGTON BLVD., CHICAGO 6

EXCLUSIVE REPRESENTATIVES IN ALL PRINCIPAL CITIES

Specify THIS NEW POPE SUPER PRECISION
1 HP, 3600 RPM MOTORIZED TOOL AND CUTTER GRINDER
CLEARANCE ANGLE SWIVELLING HEAD

With Angular Adjustment In A Vertical Plane





TIME AND MONEY SAVING FEATURES:

1. Cup wheels, generally considered best for cutter grinding, can be used for practically all clearance angles on this new head.
2. Cup wheels produce a cutting edge on tools that lasts longer because it is stronger.
3. The tooth rest remains on the center line of the cutter for practically all grinding on centers or in the work head.
4. Most cutters and reamers can be ground all over with one set-up, using the swivelling table and Pope tilting head. The usual second and third set-ups are no longer required.
5. All clearance angles read directly in degrees from the scale provided on the head. Mistakes on clearance angles are avoided.
6. The right clearance angle is assured on tools difficult to grind, such as slab mills, taper reamers, angular cutters and form tools.
7. 3600 R.P.M. — one wheel speed — safe for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.
8. The operating ease and convenience of this new Pope Head with the angular adjustment in the vertical plane saves you time and money on every tool you grind.

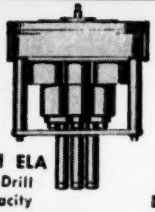
ASK FOR COMPLETE SPECIFICATIONS

No. 96

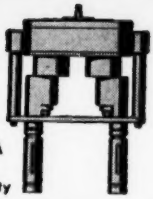
Specify **POPE** PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

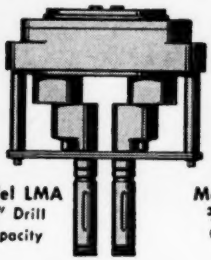
HEADS to Solve Your
Drilling, Tapping, Boring Problems



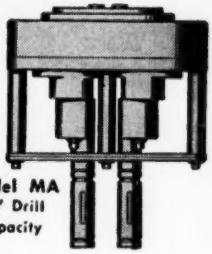
Model ELA
1/4" Drill Capacity



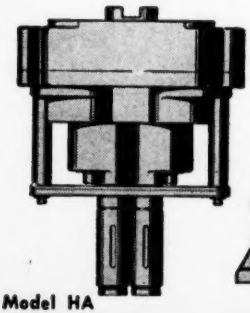
Model LA
13/32" Drill Capacity



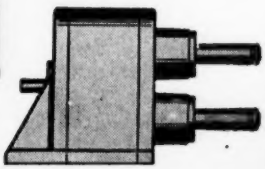
Model LMA
5/8" Drill Capacity



Model MA
3/4" Drill Capacity



Fixed Spindle Models
Size and Capacity as specified



Model HA
1 1/4" Drill Capacity

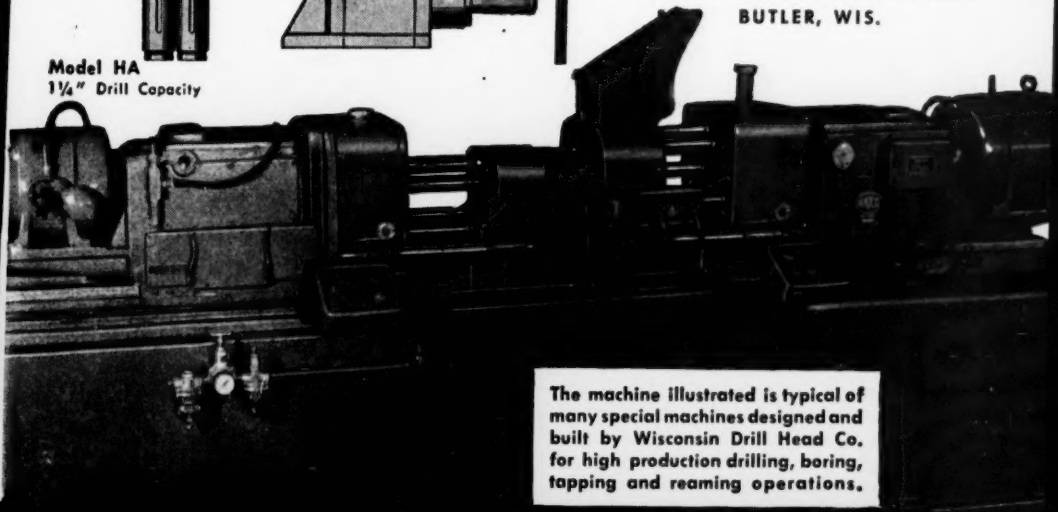
WISCONSIN *Adjustable Spindle*
Drill Heads completely gear driven... are available in 5 Standard Models, with 2 to 8 spindles and Drill Capacities from 1/4" to 1 1/4" . . . permit adjustment to any hole pattern. Adjustable Heads with 9 or more spindles are built-to-order.

WISCONSIN *Adjustable Spindle*
Drill Heads...have Two-Piece Positioning Templates for Fast, Accurate Set-ups that stay put.

WISCONSIN *Fixed Spindle*
Drill Heads are built to special order in any size or capacity specified for Drilling, Tapping, Reaming and Boring.

Look to Wisconsin for Drill Heads to solve Your Problems.

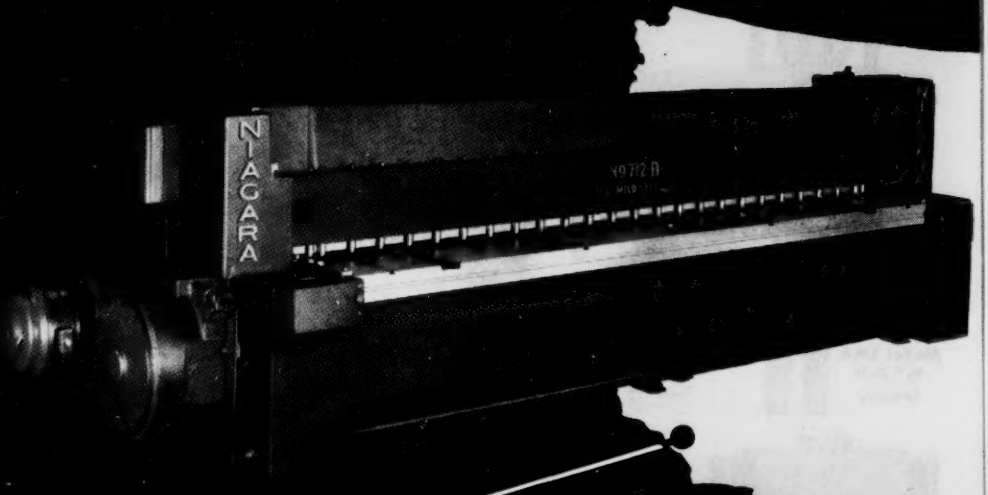
WISCONSIN
DRILL HEAD COMPANY
BUTLER, WIS.

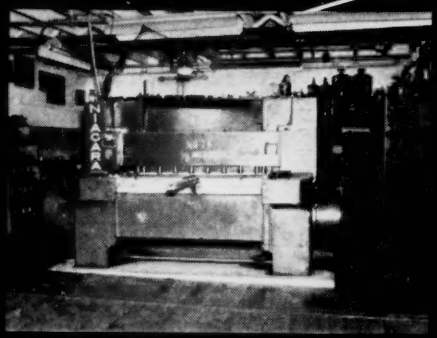


The machine illustrated is typical of many special machines designed and built by Wisconsin Drill Head Co. for high production drilling, boring, tapping and reaming operations.

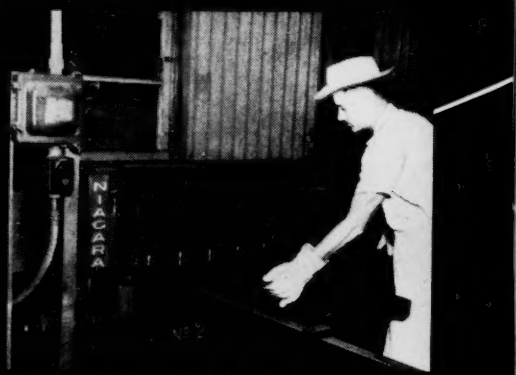
NIAGARA

SERVE INDUSTRY FROM





ELECTRONICS. Cutting .003" molybdenum to within .001" and ¼" copper with no change in set-up at a plant in California



DRUMS. Shearing sheets for drum bodies in Texas

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

SHEARS

COAST TO COAST

* For high volume shearing applications, Niagara shears are preferred because of their:

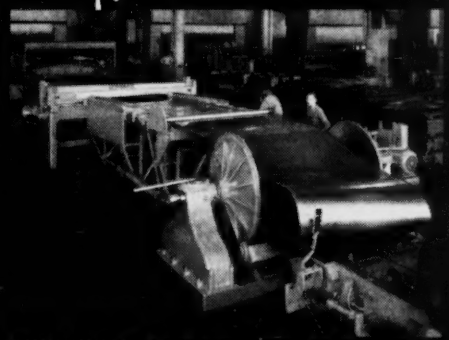
DEPENDABILITY
ACCURACY
LOW MAINTENANCE COST

A few typical installations are illustrated

Niagara builds more than 80 different sizes and capacities of squaring shears... one to suit every requirement of production, maintenance or warehousing.

ELEVATORS. Two of seven Niagara Shears in production at a large plant in New Jersey

WAREHOUSE. Shearing thousands of tons of all kinds of steel at a steel warehouse in Michigan



AUTOMOBILES. Continuous operation in a cut off line at a body plant in Western New York

America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA

Dealers in principal U. S. cities and major foreign countries

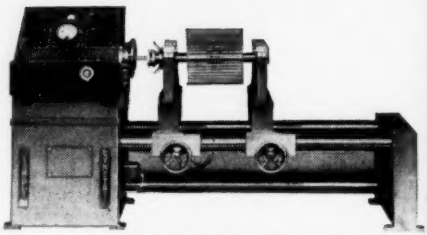
the final *check* for every rotating part...

Maybe it's a crankshaft or an armature . . . perhaps a fan or a belt pulley. No matter. The important thing is this: If it isn't *balanced,* it isn't ready for service.

Smooth operation and long life require that accurate static and dynamic balance be rated right along with mechanical specifications to assure the efficiency of the finished product.

Gisholt Balancing Machines can locate and measure unbalance vibrations down to .000025" with simple readings . . . handle any assembly from ½ ounce to 50 tons.

The cost? Very moderate. Let Gisholt Balancing Machines provide the final check. Write us.



The Gisholt Type 3U Balancer shown here is capable of balancing rotating parts or assemblies weighing from 50 to 1000 pounds. Other sizes and types are available to answer any balancing problem. Gisholt Balancers can also be furnished with correction equipment to meet your own specific requirements.

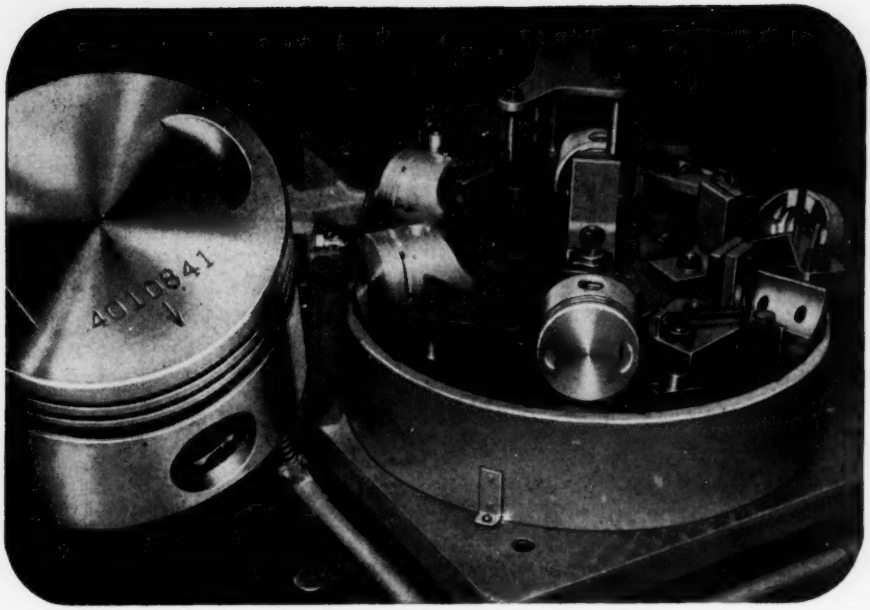
THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

DYNETRIC BALANCERS — GISHOLT — DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION "DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

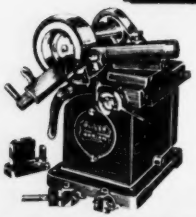


LEADING *AUTOMOTIVE* MANUFACTURERS Save Time and Money with Noblewest HIGH SPEED PRODUCTION MARKING MACHINES

The new Model 342 (illustrated above) is another fine example of Noblewest's unique ability to provide industry with high speed marking equipment for part numbering, trade marking, or date coding. This model was especially designed for permanently marking and ejecting approximately 2500 pistons per hour with absolute uniformity of impression. Basic model (right) can be tooled for marking many sizes and shapes of component parts in metal, plastic, hard rubber and wood. Whatever your needs for marking, Noblewest makes the machines, tools and dies to do the job *faster, better at lower cost.* For complete details, write Noble & Westbrook Mfg. Co., 25 Westbrook Street, East Hartford 8, Connecticut.

Long On Efficiency . . .
Long On Accuracy . . .
Long Life . . .

OLIVER DRILL POINTERS



If you want better performance from your drills you will find that machine grinding them on Oliver Drill Pointers gives faster cutting, more accuracy and longer life to your drill points than by any other method.

OLIVER OF ADRIAN

best for drill sharpening

Oliver Drill Pointers give balanced cut with each lip doing equal work—eliminating the excessive drill costs and imperfect holes usually traced to improper drill point grinding. Increase the wearing life of your twist drills by removing them at the first signs of dullness—and replace them in your machines after sharpening on Oliver Drill Pointers.

No. 510 for drills ¼" to 3"—2-3-4 flute. Variable clearances. Variable point angles. Automatic operation.

No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for our free Booklet
"How To Produce More Holes With Your Drills!"
See our catalog in Sweet's Directory

MACHINE TOOLS by OLIVER include:
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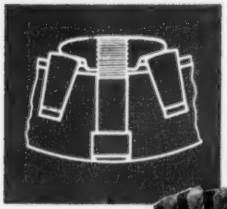
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

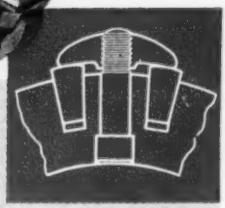
OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN



How blades are locked in the rugged body of the Continental Inside Cone Face Mill.

How blades of the Continental Outside Cone Face Mill are locked.



Production Proved

...AND REALLY RUGGED

Continental Inserted Blade Face Mills have been proved in production in Ex-Cell-O's own plants and in hundreds of plants like yours. Tool costs on rugged jobs are lower because of:

1. *accurately machined* tapered blade slots.
2. *hardened bodies* to prevent slot mutilation.
3. *close blade spacing*, heavy sections between blades.
4. *positive-lock* blades.
5. *simplicity:* no screw threads in body; no loose wedges or pins.
6. *easy adjustment:* no special tools needed.
7. *longer blades*, giving more pieces and more grinds per blade.
8. *practically-indestructible* bodies.

Order through your Ex-Cell-O representative or from catalog. Write on your letterhead for Catalog 60681 if you don't have one.

Continental TOOL WORKS

CTW

DIVISION OF EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

53-14

PYLE NATIONAL INCREASES PRODUCTION 47%!

Soldering Of Spring Assemblies Speeded By *LINDBERG* Induction Heating Unit

An hourly production increase of 47% . . and a per-operator production increase of 330% through the use of a Lindberg Induction Heating Unit! These are the money saving facts and figures reported by Pyle National Co., Chicago manufacturer of electrical components.

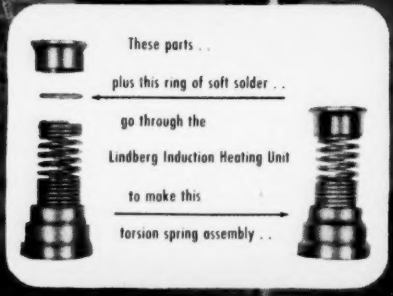
The company uses a 10 KW Lindberg unit for the production soldering of flanges to coil springs in the manufacture of torsion spring assemblies. The time cycle is 11 seconds for each assembly.

Production has been increased to 125 assemblies an hour . . with one girl operating the equipment. This is an hourly increase of 40 assemblies over the former method where soldering was done by a team of three men using gas torches. And the hourly per-operator production is up from 28 to 125!

With the induction heating unit, there are no open flames from gas torches. No extra exhaust fans are required . . there is little danger of burns to operators . . fire hazards are virtually eliminated!

And there is a substantial economy of floor space! Formerly the three torch operators required more than 60 square feet of floor space . . but the Lindberg Induction Heating Unit requires less than 30 square feet.

If your requirements call for production soldering, brazing, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.


These parts . .
plus this ring of soft solder . .
go through the
Lindberg Induction Heating Unit
to make this
torsion spring assembly . .

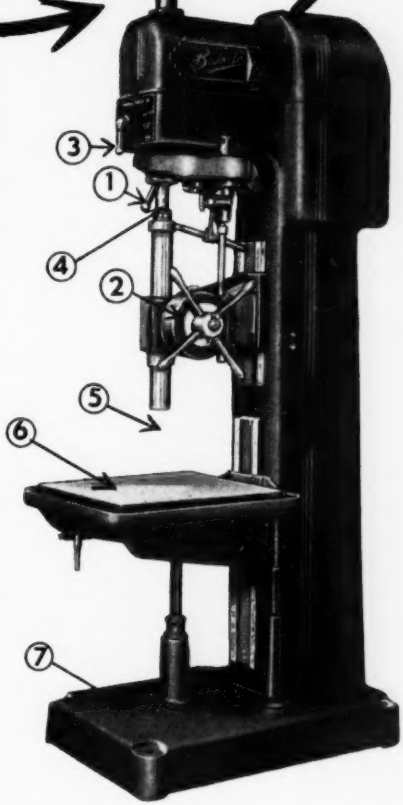
LINDBERG

HIGH FREQUENCY DIVISION

LINDBERG ENGINEERING COMPANY,
2450 West Hubbard Street, Chicago 12, Illinois

1001 DRILLING SPEEDS INSTANTLY CHANGED ① without stopping motor is a time-saving convenience that makes the "Buffalo" "RPMster" so popular in the finest shops. Motor and patented Variable Speed Drive are totally enclosed.

RPMSTER For Shops that Demand the Finest



② **POWER FEED** all-geared construction — plus BACK GEARING ③ available.

④ **6-SPLINE ALLOY STEEL SPINDLE,** precision machined and running on ball bearings.

ALL CONTROLS EASY TO REACH by operator in normal working position.

AUTOMATIC FEED HANDLE REVERSE TAPPING CONTROL available.

⑤ **27" SPACE!** Here's a 13" overhang and 0" to 27" adjustment between working table and spindle nose.

⑥ **23" x 22" WORKING SURFACE,** crank-adjusted, with oil-and-chip channel and hand-scraped dovetail slide.

⑦ **MASSIVE RIGIDITY FOR GREATEST ACCURACY** and long life. Machine is 100" high.

WRITE FOR BULLETIN 3257A for all details on this highly accurate, amazingly easy-to-handle machine used in many of the country's leading shops.

"Buffalo" MACHINE TOOLS

BUFFALO FORGE COMPANY

388 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

THIS GAGE
WAS ASSEMBLED
IN 3 MINUTES
Blocks are held rigid with eccentric clamps. No direct pressure, no cumbersome holders. The eccentric clamps oppose each other, exerting pull in opposite directions, thus maintaining a ± .000005 accuracy over entire build up, irrespective of size.
Versatile as a snap gage, ring gage, height gage and scriber. Infinite in its range.
Write for literature on Webber H.D. Gage Blocks and Fixtures.
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for machining, grinding and presswork

A UNIVERSAL COOLANT-LUBRICANT

TOOL LIFE BOOSTED 60 to 80% WITH SHEAR-SPEED SOLUBLE OIL!

machine down-time cut in the production of gears for a large auto manufacturer.

IMPARTIAL TESTS of two highly-rated cutting fluids vs. SHEAR-SPEED Soluble Oil were run under *exactly similar production conditions:* ***same machine, same parts, same cutting speed, same coolant flow, same tool grinding***

	Cutting Fluid X	Cutting Fluid Y	SHEAR-SPEED Soluble Oil	S/S Soluble Oil Gave This:
Average No. gears cut per grind	177.6	193	228	More pieces per grind
Tool stock removed per grind	.0227"	.0288"	.0188"	Less tool wear
No. of grinds per .375" hob wear	16	13	20	Longer tool life
Average tool life	2842 parts	2509 parts	4560 parts	Lower tool cost per piece

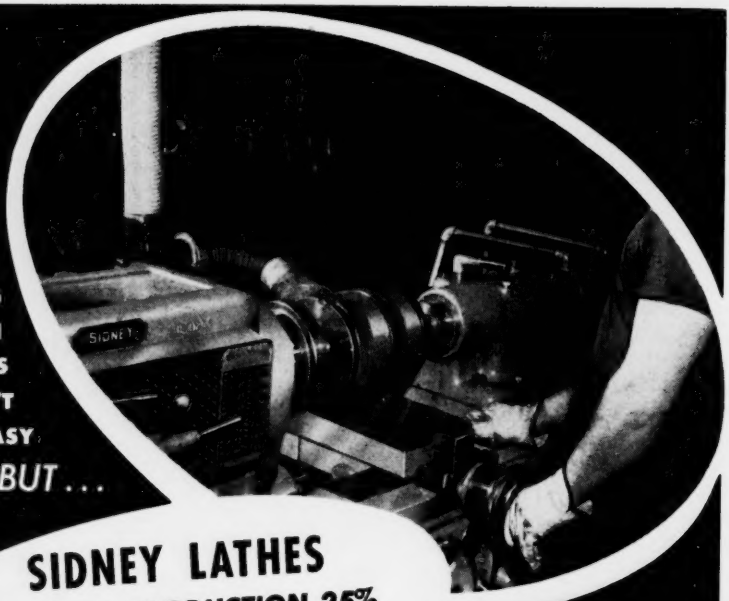
Convince yourself of the **amazing** advantages and versatility of SHEAR-SPEED Soluble Oil in your own plant. Sold only on a **satisfaction guaranteed** test basis. Write for **Bulletin SO-53** and price list.

SHEAR SPEED CHEMICAL PRODUCTS

7175 E. McNICHOLS RD. *A Division of Michigan Tool Co.* DETROIT 12, MICH.

FORM TURNING PISTON RINGS ISN'T EASY

BUT . . .



SIDNEY LATHES

INCREASED PRODUCTION 25% AND IMPROVED QUALITY FOR PERFECT CIRCLE

When you consider the millions and millions of piston rings produced by PERFECT CIRCLE you can understand what a 25% increase can mean in the total output. And think also of the infinite precision necessary to achieve the required smoothness on which so much depends.

SIDNEY LATHE'S HERRINGBONE GEARS ELIMINATE TOOTH MARKS

Here's What PERFECT CIRCLE says about SIDNEY LATHES:

"Your Sidney Lathes were built with special attachments for irregular inner diameter boring and outer diameter contour turning and slitting. *Production of surface feet per minute increased about 25%.* At the same time the quality of the product was improved because of the ability of the Sidney equipment to hold closer tolerances. These factors resulted in increased production per man hour, improved quality and enabled PERFECT CIRCLE to meet delivery dates."

PUT YOUR PROBLEM UP TO SIDNEY . . . WE'LL HELP SOLVE IT.

Write for details or contact nearest Sidney representative

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BUILDERS OF PRECISION MACHINERY SINCE 1904

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GALLMEYER & LIVINGSTON CO.
308 Straight Ave., Grand Rapids, Mich.

GRAND RAPIDS GRINDERS

MANUFACTURERS OF SURFACE GRINDERS, CUTTER AND TOOL GRINDERS, TAP AND DRILL GRINDERS.

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PRECISION BEYOND QUESTION

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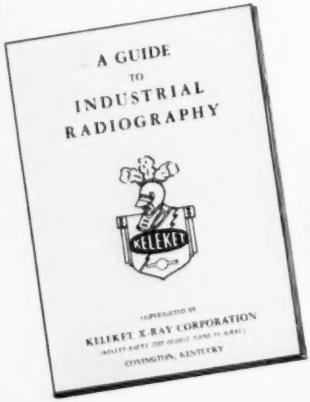

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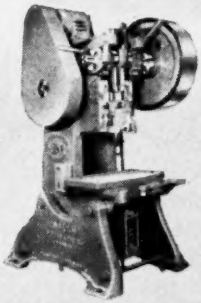

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Some made in 1907 with rugged dependability are *still* operating at a profit.
Wide selection of sizes from 6-65 tons . . . STOCK to 4 weeks delivery.
24 HOUR REPAIR *SERVICE*
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. . . give you 5 or more gages for the price of one—*reversible* and extra length for new gaging surfaces at no additional cost.
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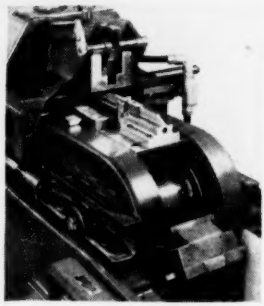
TO CUT MACHINING COSTS
machine *faster* with continuous broaching

● Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Cutting tool maintenance costs are low. We will be glad to make our recommendations on Footburt Surface Broaching Machines based on our many years in handling similar work.

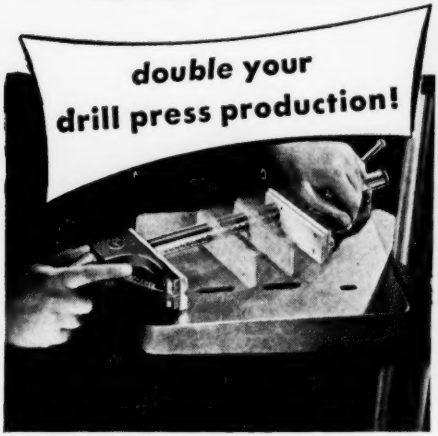
THE FOOTE-BURT CO. • Cleveland 8, Ohio
Detroit Office: General Motors Building

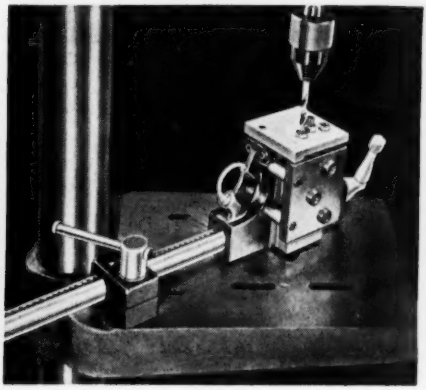


Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

FOOTBURT
MACHINE TOOLS

NEW AMF Float-Lock Instant-Change Safety Vise





IDEAL BASE FOR DRILL JIGS

Retaining its full-floating and locking features, but otherwise completely redesigned, the new AMF Float-Lock *Instant-Change* Safety Vise is faster, huskier, greater in capacity (9" and 12" jaw openings)... the most versatile, most economical work holder yet devised for drill presses!

New ratchet-locking jaw slides *instantly* to desired opening. The other, screw-operated jaw positively locks—or completely releases—work with a mere flick (about ¼-turn) of the handle.

Vise turns over readily on three sides, permits extensive drilling without removing work. Horizontal and vertical "V" grooves align and grip rounds for end drilling, centering... ideal for angle drilling. Vise serves as low-cost drill jig when locked anywhere on the table... swings out of the way when not needed. Saves so much set-up time, compared with usual work-holding devices, that good operators should easily be able to double their production!

Contact your local AMF Float-Lock distributor for a demonstration. Or write for his name and address and a copy of new, descriptive Folder WF 53-1(a). Wahlstrom Float-Lock Sales Dept., American Machine & Foundry Company, 511 Fifth Ave., New York 17, N. Y.

amf Float-LOCK instant-change SAFETY VISES

MODELS ALSO AVAILABLE FOR BAND SAWS

IDENTIFY
By Marking!

ROUND — FLAT — IRREGULAR

SHAPES

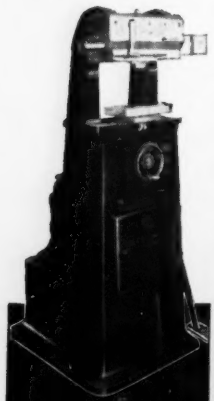
They're All the Same to Us!

Modern marking machines are built to roll lettering on almost any surface—flat, round, irregular or what have you!

Flexible tooling can be provided to handle all in ONE MACHINE.

Single purpose production machines with automatic feeds are cost reducers.

Send us your prints or samples showing markings required, and hourly production required and we will submit recommendation with quote.



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If It's Worth Marking—Mark It Well.

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Material: 28 Ton Steel
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Width of Cut: ½" +.001" −.000"
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at less cost!

CP Hicycle Portable Electric Tools for grinding, sanding, buffing and polishing not only finish products faster but they increase man-hour productivity – and at far less cost! Lightweight CP Hicycle tools operate under constant speed – there's no sag under full load. Hicycle induction motor and rugged design assure low-cost power and long service life with minimum maintenance . . . has a solid rotor, no armature to burn out . . . no commutator or brushes to replace. Write for details. Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.

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Choose Atkins hacksaw blades or bandsaws to give you the right alloy, the right edge to save time and cut costs on every metal-cutting job.

New A-TUNG
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New A-MOL
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A-MOL
Welded Edge Molybdenum . . . a general purpose blade of proved performance

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ATKINS Silver Steel SAWS

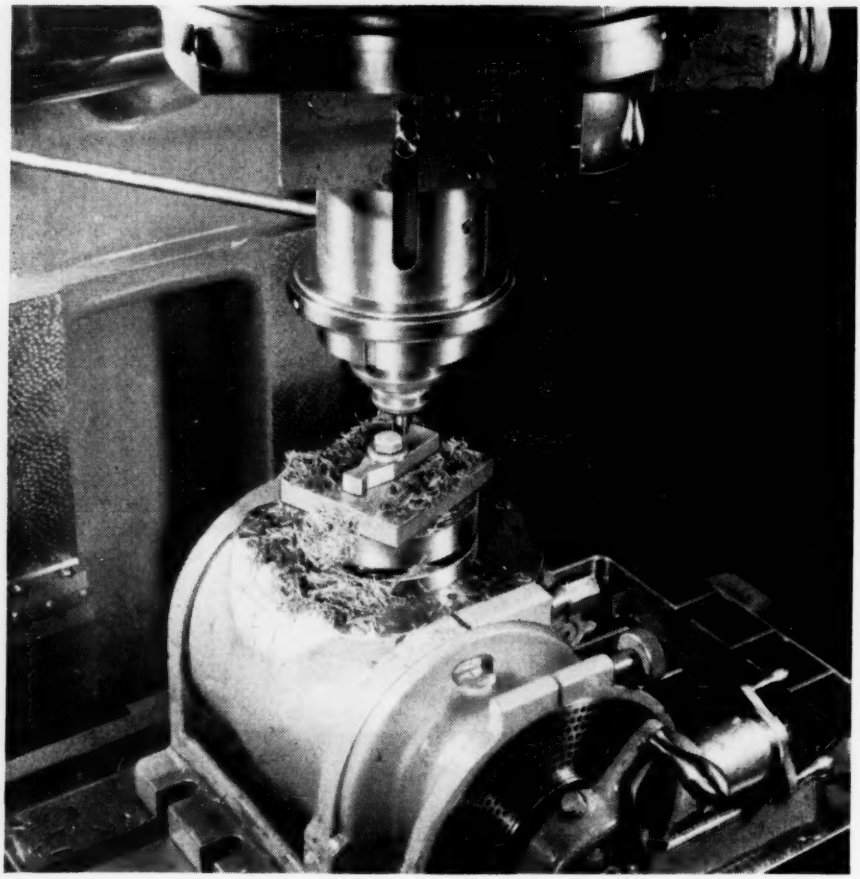
B-W ENGINEERING PRODUCTION

Whatever you saw, there's an Atkins saw that does it better!

ATKINS

ATKINS SAW DIVISION, BORG-WARNER CORPORATION
INDIANAPOLIS 9, INDIANA

This part is the blueprint, with a



PRODUCTION DATA

Part.....Control Valve Lever
Material.....SAE 1020
Cutter....½ in.—2-lip HSS End Mill
Spindle Speed.....530 rpm
Lot Size.....50 pieces
Machine.....Model D

Model D Cycle Time (floor to floor)—17 minutes

Previous cycle Time (floor to floor)—24 minutes

finish milled direct from single setup, in 17 min.

Kearney & Trecker Model 2D Rotary Head Milling Machine saves six hours on 50 piece run

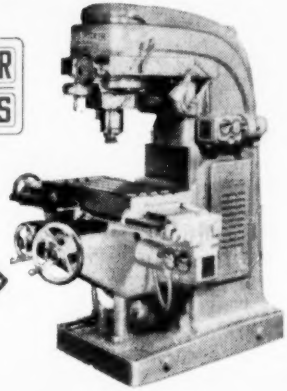
HERE is another example of the tremendous time and tooling savings possible with the rotary head milling method.

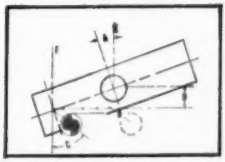
This manufacturer used to complete a control lever every 24 minutes. Now the same work is completed in only 17 minutes . . . and no multiple setups or expensive form cutters are necessary. The blueprint is the only guide the operator needs — the machine's precise mechanical control of the cutter's angular and radial movement does the rest.

The Rotary Head Milling Machine Production Idea Booklet contains examples of how this method has been found exceptionally efficient in solving production, die, forging and metal pattern milling problems.

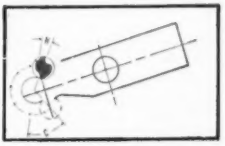
Address requests to Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wis.

If you have production problems in molds, dies, or selected production milling operations — investigate the Model 2D Rotary Head Milling Machine.

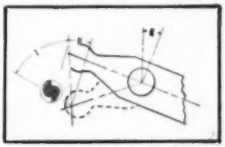




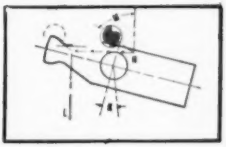
1. MILL 20° ANGLE. Index piece to (A), offset spindle slide to (B), set head to (C), saddle to (D). Feed table (E) to (F).



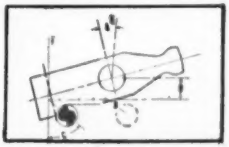
2 MILL .642/.645 DIAMETER. Rotate head (C) to (H).



3. MILL 1⅝ IN. RADIUS. Rotate head from (H) to (J), index head from angle (A) (Oper. 1) to angle (K).

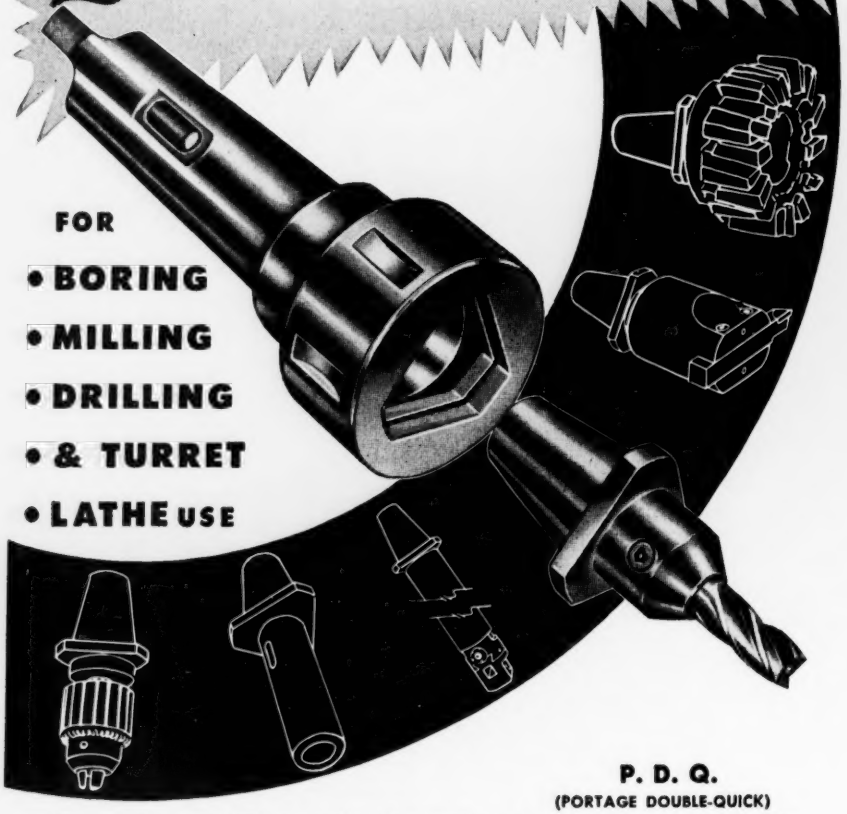


4. MILL 20° ANGLE. With piece at K), move center of head to (L); rotate head to (M). Feed table (L) to (N).



5. MILL SAME FORM ON OPPOSITE END. Repeat operations 1 through 4.

Quick Change Tools



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Send for catalog describing individual holders and adapters or for specific information on your machine tools.

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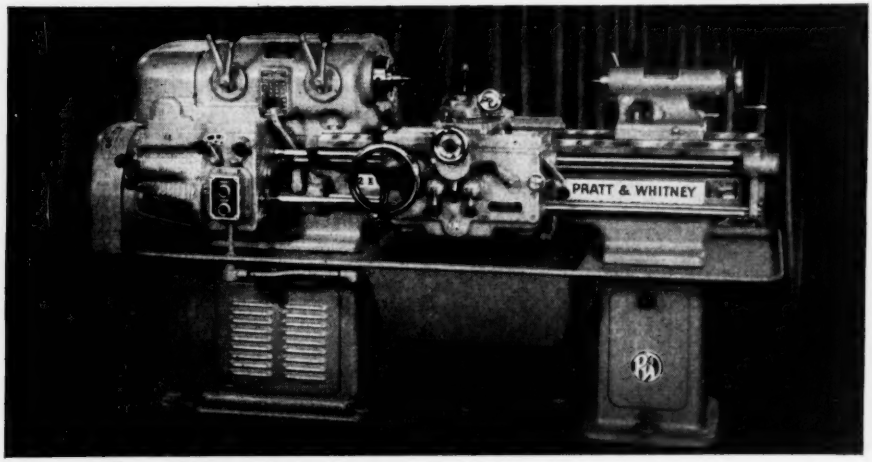
MODEL "C" *Lathes* **12" and 16" SIZES in standard bed lengths**



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Today, countless manufacturers must maintain daily standards of tool room accuracy unheard of only a few years ago. If this is **your** problem, you can't afford "almost as good" equipment. It's time to invest in a P&W Model "C" Lathe. Finest example of all that Pratt & Whitney stands for, the Model "C" incorporates every detail of advanced design, honest material and conscientious workmanship that help make this the finest lathe available anywhere at any price.

FOR COMPLETE INFORMATION . . . use this coupon to send for your copy of Circular 539 that fully describes all of the advanced features of the Model "C" Lathe. See for yourself how it will help you establish and maintain new standards of accuracy in your tool room.

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DIVISION NILES-BEMENT-POND CO.

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Please send my copy of Model "C" Lathe Circular No. 539.

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COMPANY_____

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It's good to see your smile of *satisfaction*, Frank!

Mr. Franklin, foreman, (Frank to us), knows his taps and gages. He measures their efficiency by the one standard of *"performance-ability"*... performance on the job and the cost records. That's why this experienced supervisor specifies —

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The Hanson Process is the original method of *finishing after hardening*. Through this process, Hanson-Whitney has for 34 years produced a quality line of finished precision taps and gages to the complete satisfaction of our customers.

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Threading Processes
Offer Complete
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7WH53B

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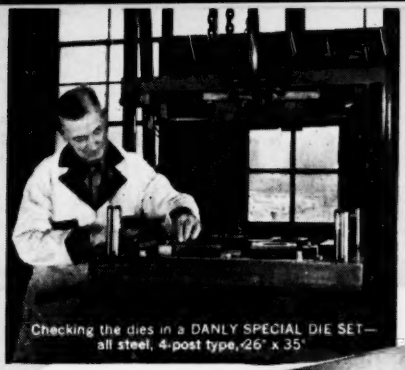
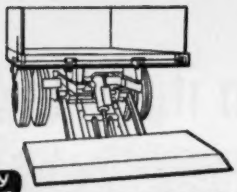
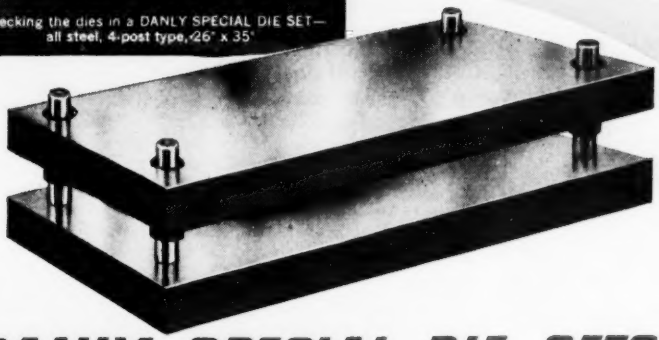


Checking the dies in a DANLY SPECIAL DIE SET—all steel, 4-post type, 26" x 35"



ANTHONY LIFT GATE HYDRAULIC

SHOWN IN LOADING POSITION



DANLY SPECIAL DIE SETS

View showing DANLY SPECIAL DIE SET during production run. Tail gate gussets are blanked and pierced in a single stage operation from 10 gage blue annealed sheet.

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DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS SUPPLIES

help Anthony give industry a lift!

For years now, the Anthony Company, makers of hydraulic lift gates for motor trucks, has relied on Danly Special Die Sets in their production operation. Based on long experience, they've found that Danly Special Die Sets cut their tooling costs and save time . . . because they provide the finest precision starting point for diemaking. Why not build your production dies in Danly Special Die Sets? . . . see what die performance can really mean.

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Do it BETTER, FASTER, FOR LESS with

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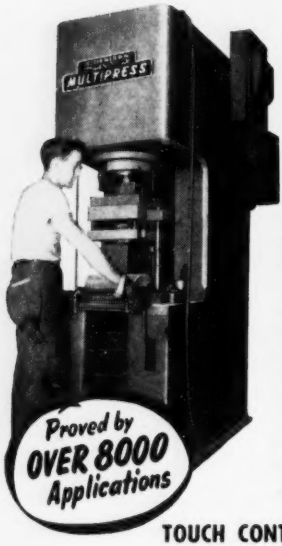

Multipress offers maximum advantages of hydraulic power — *rapid action, wide adjustability, and accurate control* — in eight frame sizes that meet an unusually wide range of production needs.

Ram speed, maximum tonnage, and stroke length are quickly adjustable to changing needs. Stroke can be set for either distance or pressure limits. Choice of controls includes hand lever, push-button, foot-pedal, automatic cycling, and manual or electric dual-safety controls. Denison's exclusive "Vibratory Ram Action" is available to solve problems of air escapement from dies, density control, or uniform compaction.

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SELECT THE FEATURES THAT FIT YOUR JOB

SPECIFICATIONS		BENCH MODELS					FLOOR MODELS			
Frame Size		B	D	F	G	H	K	L	N	Q
Capacities (Tons)		1	2,3,4,6	2,4,8	5,10	5,10,15	25	35	50	75
Max. Ram Speeds (I.P.M.)	Closing	1100	1300	1300	700	700	530	530	290	210
	Pressing	400	570	570	220	280	250	250	145	110
	Opening	600	920	920	310	500	470	470	290	220
Max. Stroke		6"	12"	12"	12"	12"	15"	15"	15"	15"
Max. Daylight Open'g		15⅜"	12"	18"	24"	23"	24"	24"	24"	30"
Throat Depth		5"	6"	8⅛"	12"	10"	12"	12"	12"	10"

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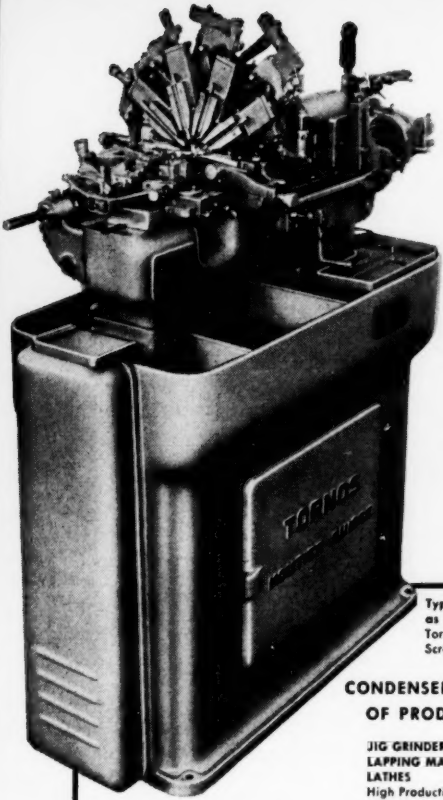

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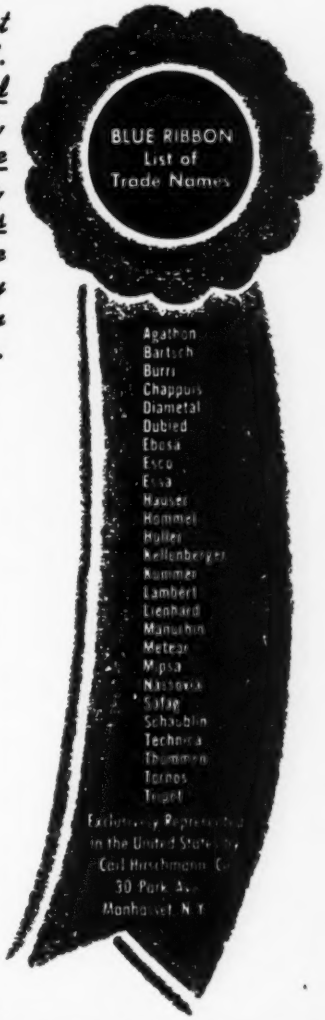

Typical as to precision and as to fame of trade name. Tornos R10 Swiss Automatic Screw Machine.

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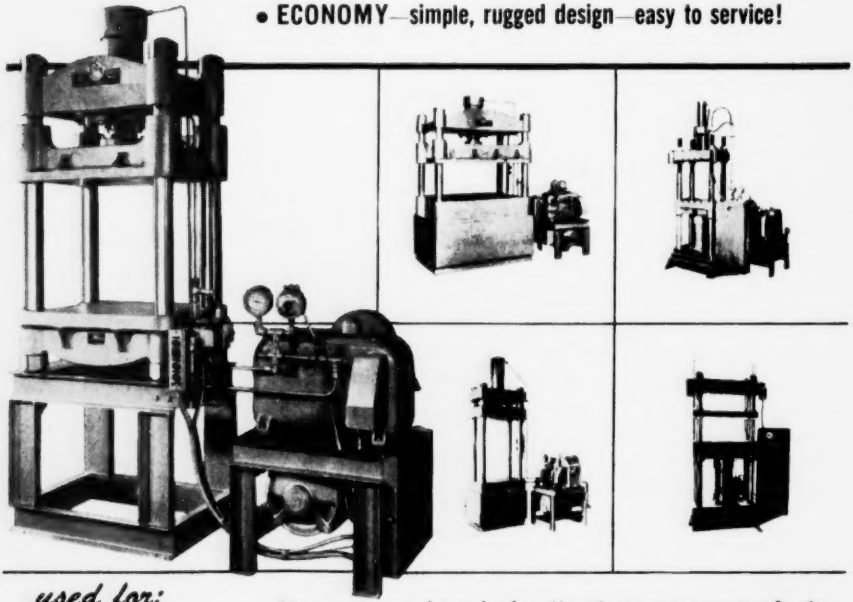

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- METAL FORMING
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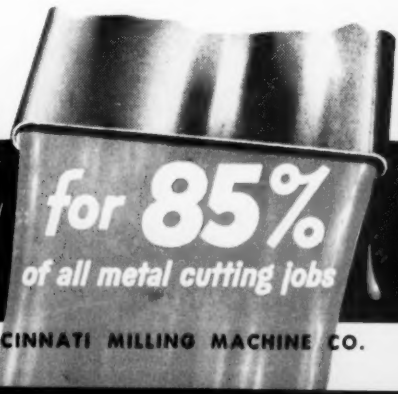
For a demonstration, write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "Cimcool Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

°Trade Mark Reg. U.S. Pat. Off.



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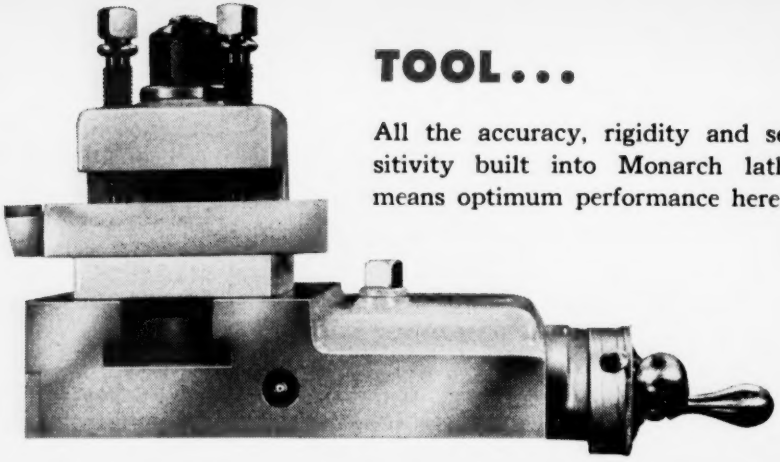
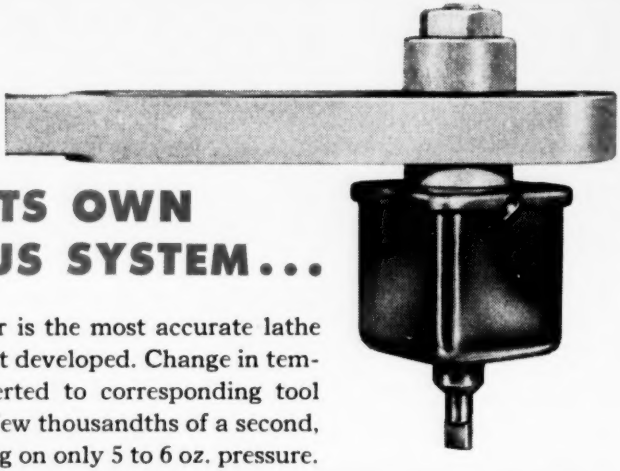


TOOL...

All the accuracy, rigidity and sensitivity built into Monarch lathes means optimum performance here.



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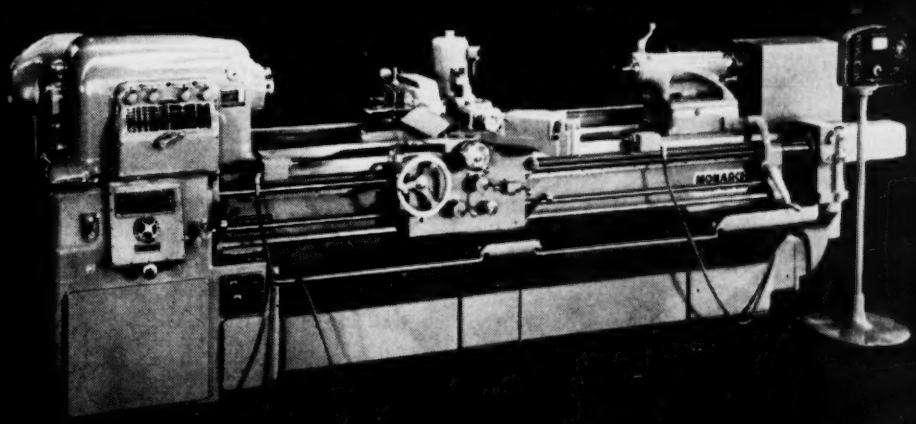
The Air-Gage Tracer is the most accurate lathe duplicating device yet developed. Change in template shape is converted to corresponding tool position change in a few thousandths of a second, tracer stylus operating on only 5 to 6 oz. pressure.

...AND BRAIN...

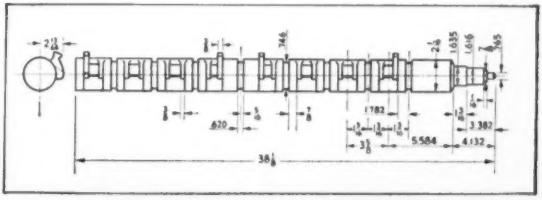
The Auto Cycle Unit is an *extra* push button control feature. Provides feed change as you need it . . . gives full automatic cycle operation . . . saves more time with fast traverse return.

TOOL . . . WITH ITS OWN NERVOUS SYSTEM . . . AND BRAIN!



Put all this together . . . and you get the exclusive Monarch Air-Gage Tracer story in a nutshell. Higher output. Lower costs. Highest standards. Production at a profit. See typical job below. Our Booklet #2606 gives many other examples, full details and specifications. Ask for it and see how tracer controls and Auto Cycle Unit can be applied to most Monarch Lathes. Write and indicate your interests . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

Finger Lock Bar. *Material*–SAE 1045 forging. *Operations performed*–Turn complete. *Machine*–Series 60 Lathe with Auto Cycle Unit. *Total machining time*–1 hour. *Time formerly required*–4 hours.



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. . . TURN TO MONARCH

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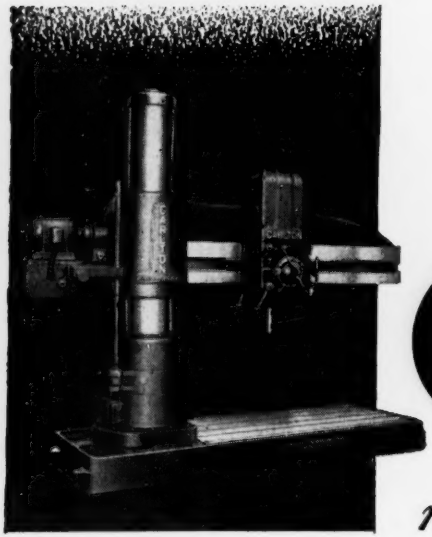
ACCURACY • ECONOMY • LONG LIFE



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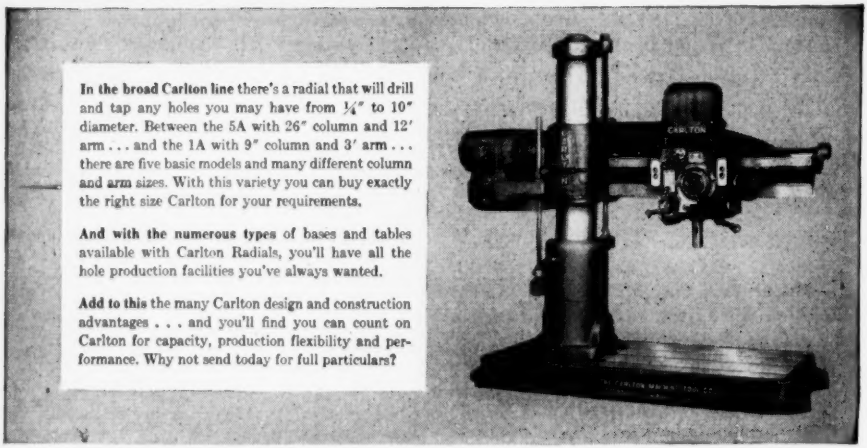
Carlton

for all your radial drill requirements



In the broad Carlton line there's a radial that will drill and tap any holes you may have from ¼" to 10" diameter. Between the 5A with 26" column and 12' arm . . . and the 1A with 9" column and 3' arm . . . there are five basic models and many different column and arm sizes. With this variety you can buy exactly the right size Carlton for your requirements.

And with the numerous types of bases and tables available with Carlton Radials, you'll have all the hole production facilities you've always wanted.

Add to this the many Carlton design and construction advantages . . . and you'll find you can count on Carlton for capacity, production flexibility and performance. Why not send today for full particulars?

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO, U.S.A.

Gentlemen: Please send me bulletin(s) checked below:

NAME _____

ADDRESS _____

CITY _____ STATE _____

- ☐ 1A– 9" col. 3'-4' arms; 11" col. 3'-4'-5' arms
- ☐ 3A– 13" col. 4'-5' arms; 15" col. 4'-5'-6' arms; 17" col. 5'-6'-7' arms
- ☐ 4A– 19" col. 6'-7'-8' arms
- ☐ 5A– 22" col. 7' to 10' arms; 26" col. 8' to 12' arms

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EXTRA men
EXTRA service
at no extra cost . . .
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DEALER
Sure, you expect delivery and service from your industrial distributor, but you will find there's something EXTRA about the service from your Brighton Socket Screw Distributor—an extra interest in your fastener needs, extra desire and ability to fill those needs.
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Take advantage of all the EXTRAS your Brighton distributor offers. If you are not already acquainted, write for his name.
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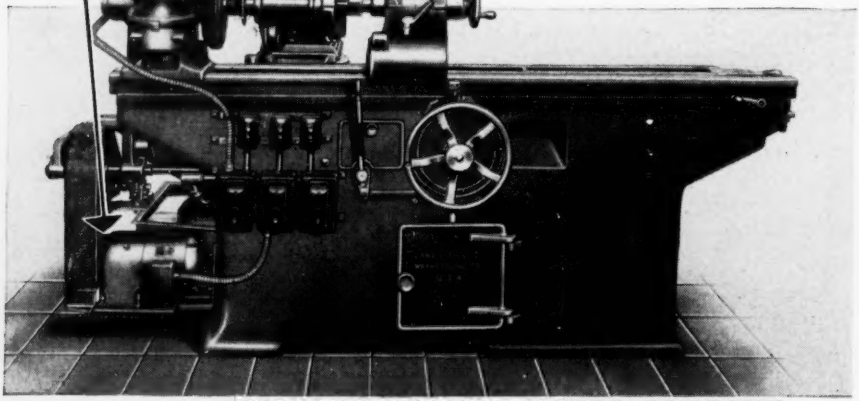
FOR INDIVIDUAL MOTORIZATION

The Landis Universal Grinder illustrated has been individually motorized with two LIMA GEARSHIFT DRIVES and one LIMA MOTOR to meet requirements of the machine for both constant and selective speeds.

This is but one of many motorization problems easily solved by the combined use of Lima Drives and Lima Motors. Lima units are used extensively on standard and special machine applications, as well as by original equipment manufacturers.

If you have a Drive or Motor problem, why not consult LIMA — their Field Engineers have wide experience in machinery motorization and can provide the solution. Write today for the address of your nearest Lima Field Engineer — he will be glad to assist you.



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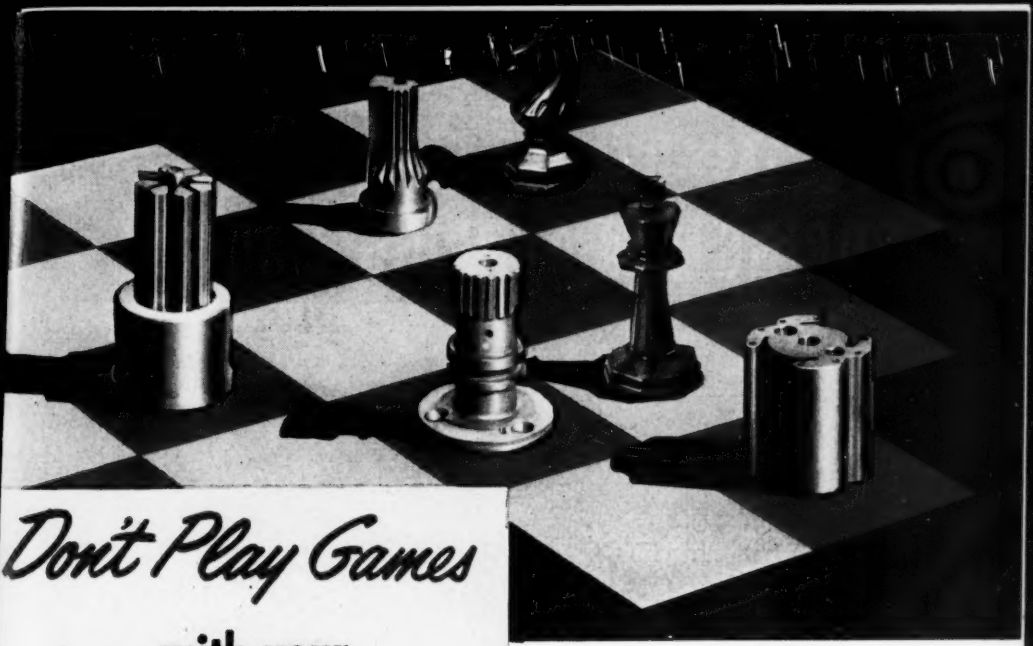
LIMA MOTORS

FIRST . . . FOR DRIVES . . . MOTORS . . . GRINDERS



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Whether it's carbide or steel — accuracy and precision are watchwords from top to bottom in the Harig organization. Many years of experience in serving the highly specialized needs of American industry are built into every Harig product. It is your guarantee of superior craftsmanship and on the job performance.

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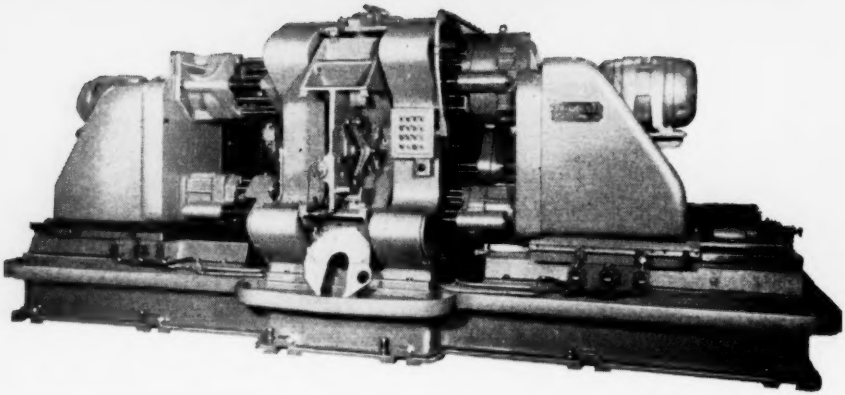
Manufacturing Corp.
5761 W. HOWARD ST. • CHICAGO 31, ILL.

SPECIAL DOUBLE-END DRILLING, BORING and TAPPING MACHINE

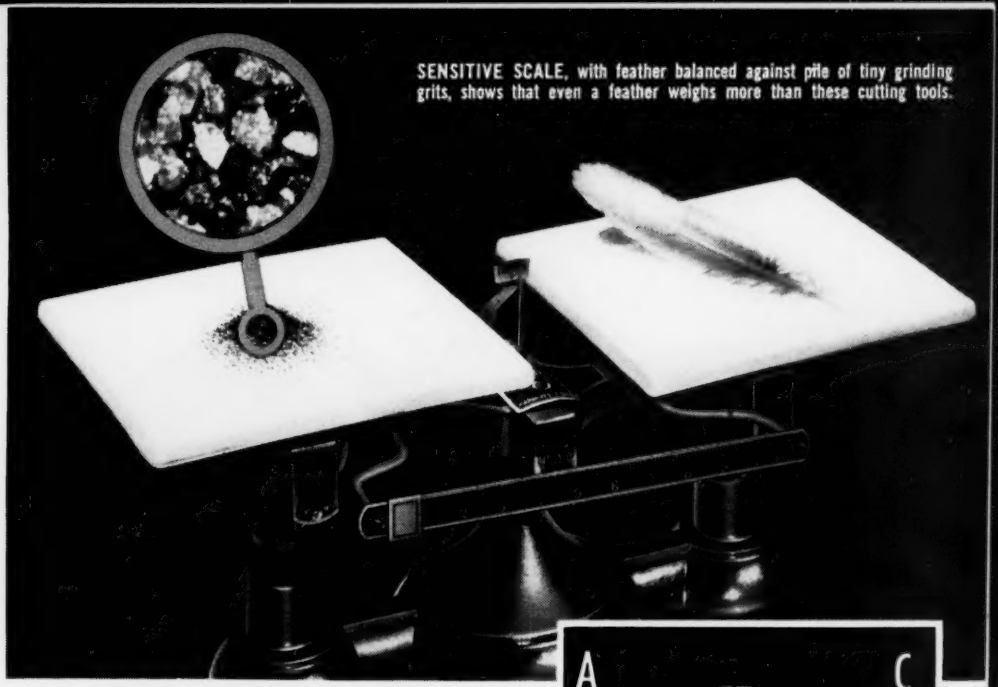


Illustrated is one of the special machines we are constantly building, in addition to our line of MULTIPLE DRILL HEADS, to meet the specific requirements of plants, large and small. This machine is used for drilling, boring and tapping the adapter plate on an automatic transmission . . . The part is completely bored, drilled and tapped on this machine. We are using two of our Standard HH-20 Horizontal Way Type Units with an Automatic Index . . . The complete cycle is 30 seconds. The part is clamped with hydraulic cylinders.

We solicit your inquiry as to any special drilling, milling or boring operations you may have.

MICHIGAN DRILL HEAD CO.

971 E. EIGHT-MILE ROAD • HAZEL PARK, MICH.



SENSITIVE SCALE, with feather balanced against pile of tiny grinding grits, shows that even a feather weighs more than these cutting tools.

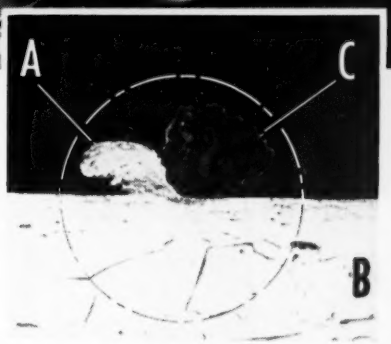
A FEATHER OUTWEIGHS THESE CUTTING TOOLS

Core of an entirely new approach to grinding wheels is the tiny grinding grit. Years of research by Cincinnati Milling has confirmed that grinding is a true chip cutting process.

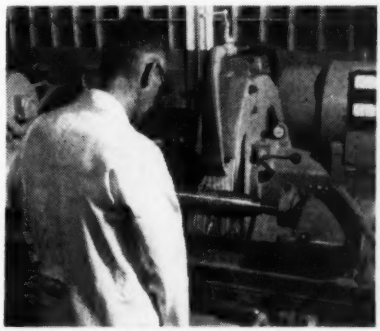
Here is the starting point of development of the grinding wheel as a true cutting tool. Cincinnati Milling has developed and tested CINCINNATI GRINDING WHEELS over a period of several years as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of CINCINNATI GRINDING WHEELS, write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co. Or, if you prefer, write for the free booklet "A New Concept In Grinding Wheels."

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



FROZEN ACTION — Tiny steel chip (A) is shown being cut from workpiece (B) by a grinding grit (C).



EXPERIMENTAL WHEELS performance is checked by member of research staff on one of several grinders in the Cincinnati Grinding Wheels Laboratory.

FIVE CENTS

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Great pains are taken to ensure that all Crucible REX High Speed Steels are uniform. Every scientific test known is used to make certain that all materials conform exactly to Crucible's high standard of quality. And only *Crucible* makes REX High Speed Steels.

REX High Speed Steels are readily available in all parts of the country... through the widest distribution system maintained for tool and other special purpose steels. For uniformity and dependable delivery, call your nearest Crucible warehouse.

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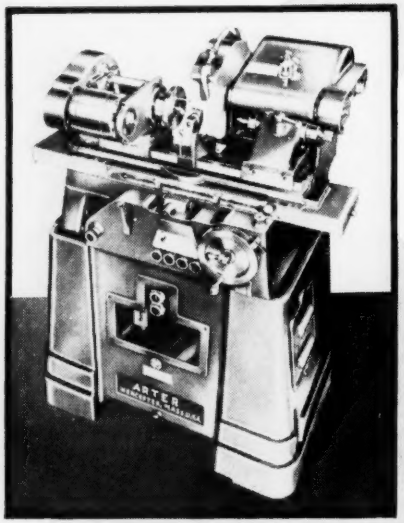
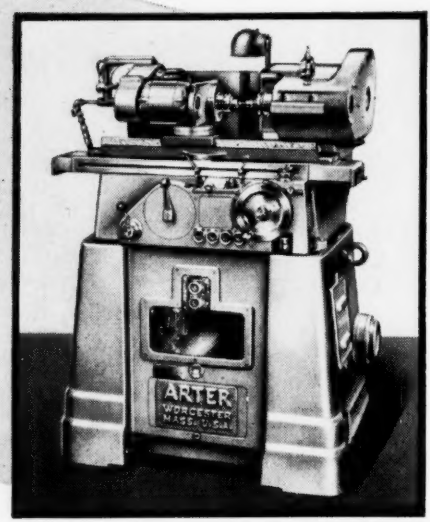


Model EG "103" Cylindrical Grinder

Model "103" Cylindrical Grinder — dual purpose external cylindrical and internal grinding machine, built as an external grinder only, or as an internal grinder only. Convertible equipment available at any time. Hydraulic table movement, hand and automatic in-feed of the wheelhead through worm, worm wheel and screw. Work table, wheelhead and headstock can be swivelled for grinding angular work. Face grinding also possible.



Model IG "103" Internal Grinder

Model IG "103" Internal Grinder has the same general construction and operating means as the cylindrical grinder. The self contained wheelhead has a ¾ h.p. in-built motor with belt drive for either a 15,000 or 32,000 RPM spindle unit. Machines are self contained, the coolant tank and hydraulic oil tank being within the base.

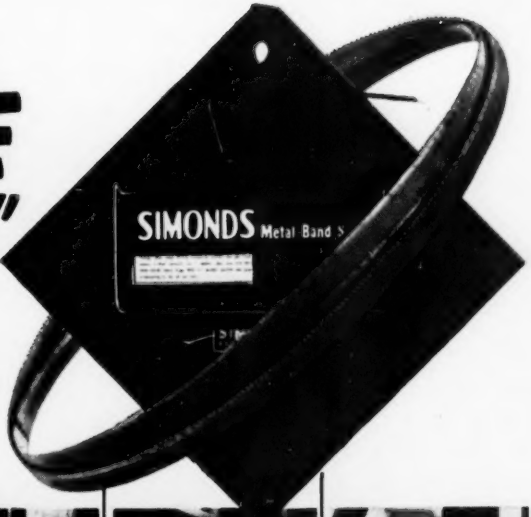
Write today for complete details and specifications

Arter GRINDING MACHINE CO.

WORCESTER 5, MASSACHUSETTS

Rotary Surface Grinders, Flat Circular Cutter Grinders, Internal Grinders, Cylindrical Grinders, Carbide Tool Grinders.

Pick the Top "NAME BAND" for all these Metal-Sawing Jobs



For Heavy Production Cutting

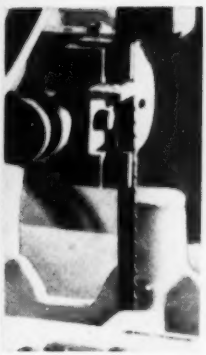
You'll like this rugged, break-resistant standard tooth blade for trimming gates and risers off castings, cutting metal bars and other tough production work. Hardened along the tooth edge only, it cuts fast, stays sharp, gives a longer run for your money! All standard widths and tooth spacings. Furnished in 100′ and 300′ coils or welded to length for specific machines.

For Contour Cutting and Die Making

In the narrower widths, this edge-holding, smooth cutting blade is an outstanding favorite for contour work. Because the teeth are set with absolute evenness on both sides of the blade, you can depend on straight, on-the-line cuts with no "leading." All standard widths and tooth spacings furnished in 100′ and 300′ coils or welded to specified length.

For Horizontal Cut-Off Work

Furnished either Regular or Wavy Set in the wider widths, this Simonds-made standard tooth blade easily handles the wide variety of cutting required in general shop and steel warehouse operation. All sizes come in 100′ and 300′ coils or welded to length.



For Cutting Soft Materials

This Skip-Tooth Hard Edge Blade has extra gullet capacity with maximum blade strength . . . gives fast, trouble-free service in cutting aluminum, magnesium, plastics, plywood and hardwood. All standard sizes available in 100′ and 300′ coils or welded to length for specific machines.

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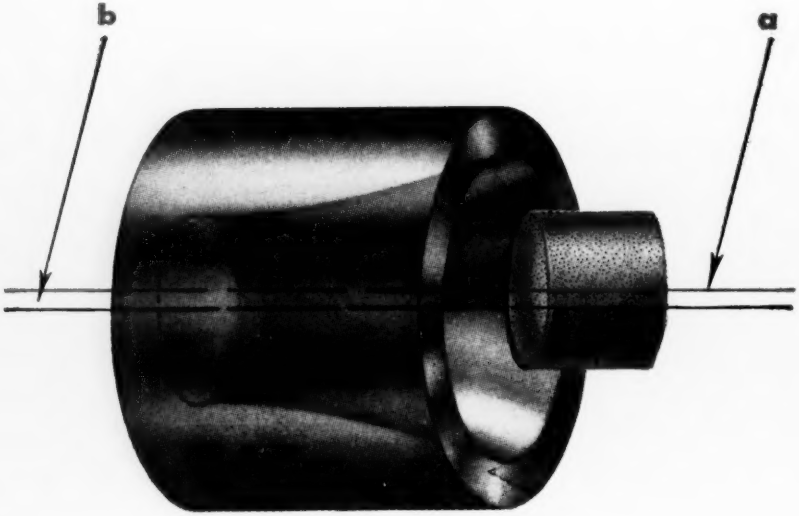
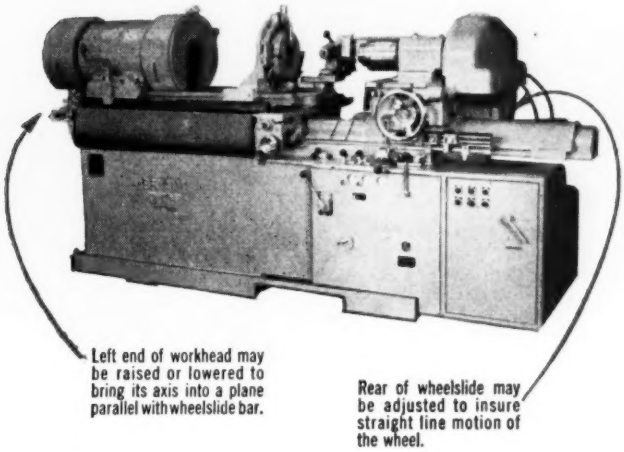
alignment

for better internal grinding



TO GRIND a taper, the internal grinder must be set up according to simple geometric principles; that is, the path of the grinding wheel must be a straight line and must intersect the axis of the workpiece at a point. In the illustration, the axis of the wheel path "a" and the axis of the work "b" lie in parallel planes. The axes cross, but fail to intersect. Under these conditions, it is impossible to grind a true taper. As the grinding wheel enters the large end of the taper, the point of contact is high. This end of the taper can be ground to size. As the wheel progresses through the hole, the contact moves even higher, with the result that the hole will be progressively oversize and a curve is generated instead of a uniform taper.

A taper ground under these conditions probably will blue only in the middle. Turning the workhead may shift this plug contact but, as the wheel wears, the plug contact will continue to move. The remedy is to correct alignment so the wheel path and wheel axis "a" and the work axis "b" intersect and lie in a plane which includes the diamond. Then a uniform taper will be generated. In shop practice the adjustment would be made by bringing the wheel and work to exactly the same center height.


Left end of workhead may be raised or lowered to bring its axis into a plane parallel with wheelslide bar.
Rear of wheelslide may be adjusted to insure straight line motion of the wheel.

This semi-automatic machine is for grinding bores in long parts and is adaptable for either production or tool room work. It will swing work up to 16″ and grind bores up to 9″ depth. The work is held in a standard hollow work spindle and steady-rest. The workhead may be adjusted longitudinally over a distance of 37″ to meet the requirements of a large variety of work. It may be pivoted for grinding a taper up to 30° included angle. Hydraulic operation provides a wide range of traverse speeds. Write for folder.

Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

Compactness

IS THE RULE ON ALL

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SERIES R H 2000 P.S.I. and SERIES C H 1000 P.S.I. HYDRAULIC CYLINDERS

On all of your hydraulic cylinder applications the appropriate Pathon cylinder will give you the minimum in mounting size with increase strength and fatigue life.

A PATHON HYDRAULIC CYLINDER HAS...

LOW STRESS CONCENTRATION through the head to barrel attaching area providing a plus factor for shock loads. The single screw thread attaching method gives maximum strength in minimum space.

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AIR CYLINDERS...HYDRAULIC DIRECTIONAL CONTROL VALVES...HYDRAULIC CYLINDERS

13 Key Moore Tools help put the PRECISION in Harig Dies

KARL HARIG

"When owner-management invests its money in machinery," says Karl Harig, founder and president of Harig Manufacturing Corporation, "it does so only after a thorough analysis and careful selection of available equipment." So it's significant that Harig, one of America's foremost producers of carbide, lamination, progressive, stamping and other types of precision dies, employs 13 Moore precision-built machine tools for many of its most critical toolroom operations.

A trip through Harig's modern Chicago plant reveals:

3 MOORE JIG BORERS, for accurate locating and boring of holes in a fraction of the time required by other means;

6 MOORE JIG GRINDERS, for relocating and grinding of holes and contours—within tenths—after hardening;

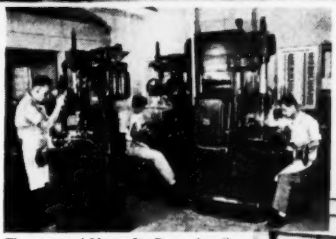
3 MOORE PANTO-CRUSH WHEEL DRESSERS, for speedy, cost-cutting performance of both crush-forming and diamond-dressing on the wheel spindle of a surface grinder;

1 MOORE DIE FLIPPER, for "mechanized" die tryouts and assembly.

The combination of Harig craftsmanship and Moore precision tools has been an important factor in Harig's successful effort to meet continuing demands for faster production of intricate dies, tools, jigs, fixtures and gauges.

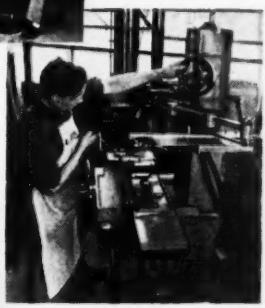
Why not discover how Moore tools can bring more speed and greater accuracy to *your* toolroom. Write today for our detailed literature.

Moore Special Tool Company, Inc.
730 Union Avenue, Bridgeport 7, Connecticut



A battery of six Moore Jig Grinders performs precision internal and contour grinding operations on sectional die parts at the Harig plant.

Three rugged Moore Jig Borers handle the bulk of Harig's critical spotting, drilling, boring and reaming operations.



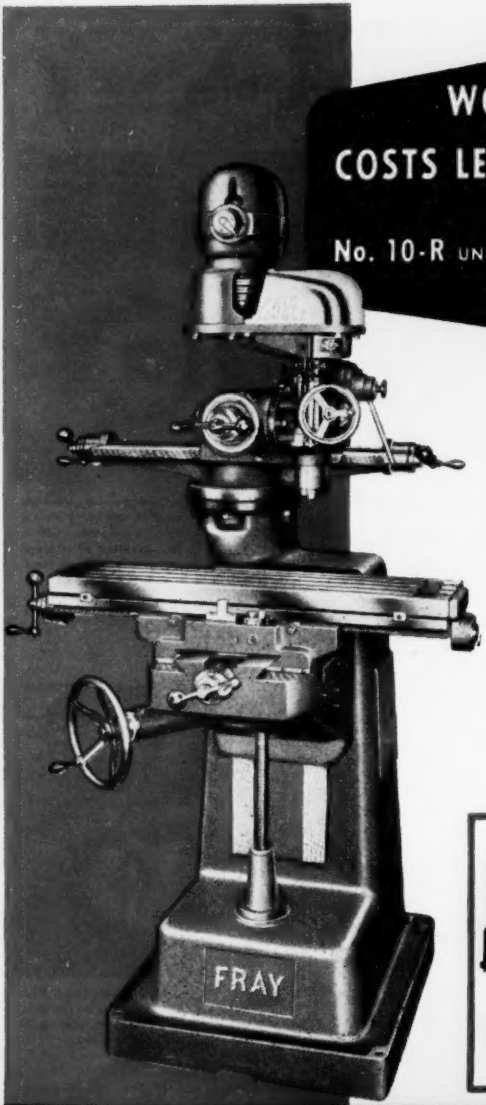
Harig uses this Moore Panto-Crush Wheel Dresser on a surface grinder for fast pantograph profile grinding. Harig also has two more of these cost-cutting units.

A Moore Die Flipper facilitates accurate die tryouts and assembly at Harig, replaces time-consuming hand-labor methods.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS · JIG GRINDERS · PANTO-CRUSH WHEEL DRESSERS · DIE FLIPPERS · MOTORIZED CENTERS · HOLE LOCATION ACCESSORIES

see our catalog in MACHINE TOOL CATALOGS or write for copy



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COSTS LESS with a

No. 10-R UNIVERSAL RAM • TURRET TYPE • VERTICAL MILLING MACHINE

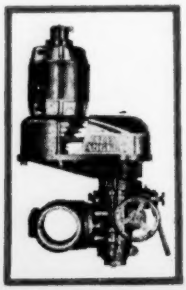
You get a wider work range than with any other machine this size. You can machine at *any* angle—vertical, horizontal or both. You can mill, drill or bore at *any* angle. Hence resetting isn't necessary. Just change the machine—changing is quick. (For vertical and regular horizontal milling, use the 10-RH.) Jobs are done faster and better . . . at less cost. • It's Universal • Rugged • Easy to Operate.

A high precision tool.

Write for details and specifications.

Bulletin 10.

FRAY "ALL-ANGLE" HEAD TYPE 4

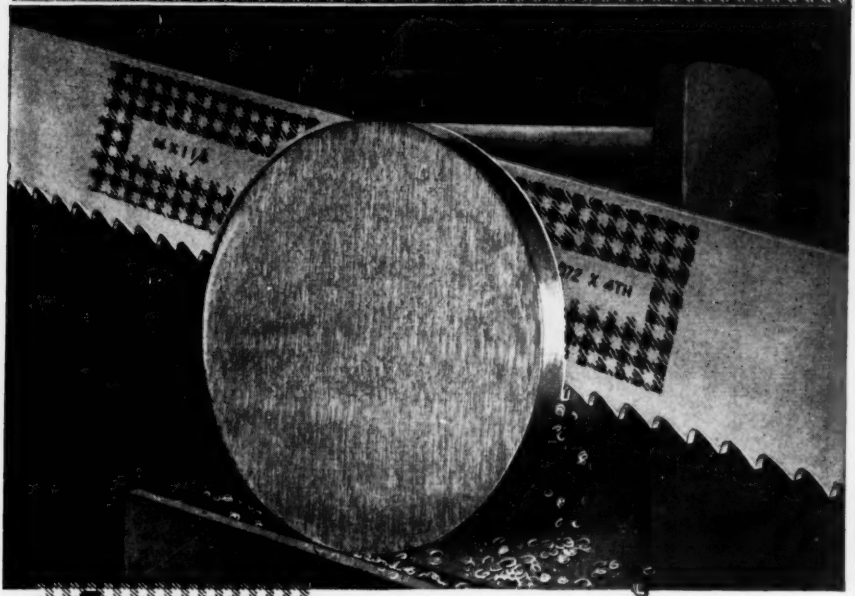


For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.

All-Angle

FRAY MACHINE TOOL CO.

When the chips are down



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are best by every test!

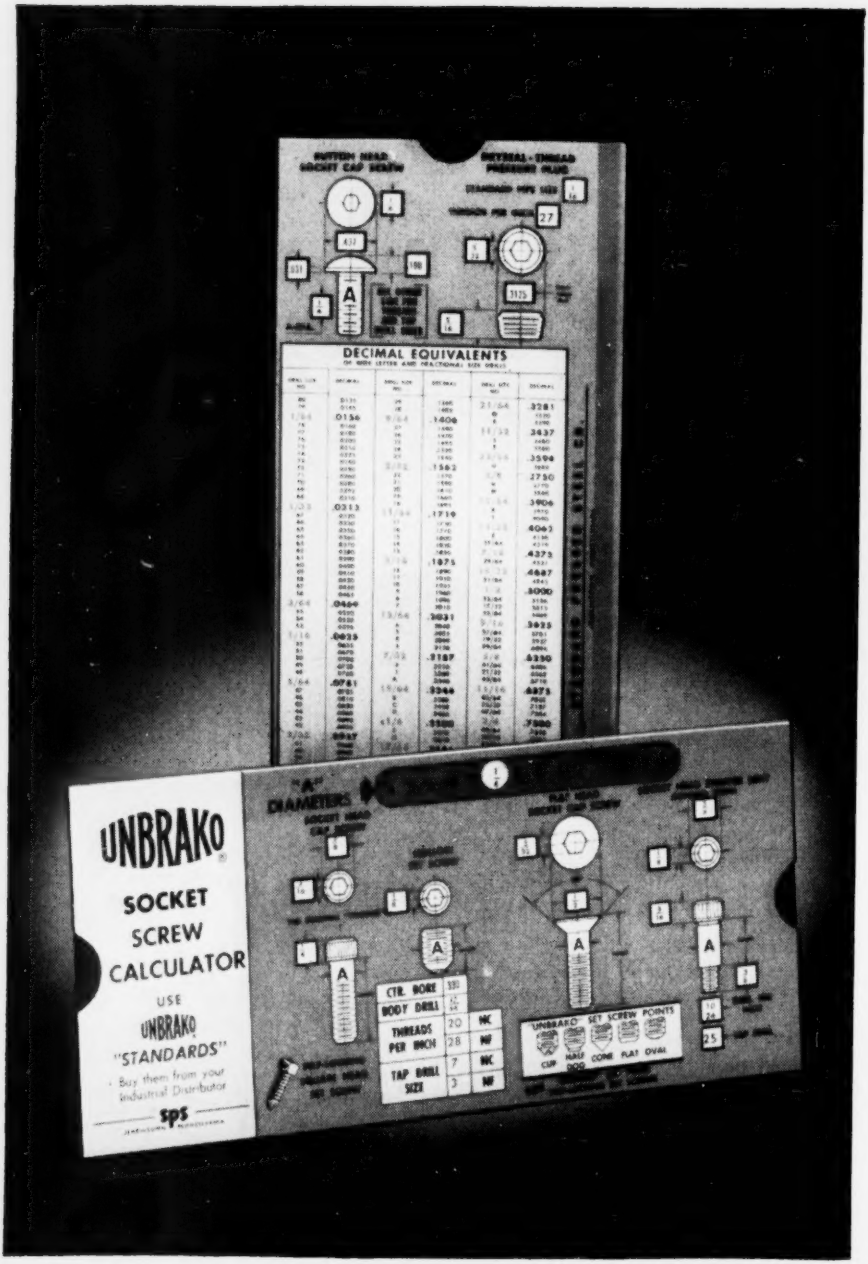
QUALITY . . . The very finest in both steels and workmanship

SERVICE . . . Prompt Deliveries

TECHNICAL ASSISTANCE . . . Whenever needed on unusual or difficult cutting problems

These things we pledge to you. The final test is on your own machines. Try Lenox for yourself . . . on any job . . . against any other blade in the world. Then you be the judge.

LENOX AMERICAN SAW & MFG. COMPANY
Springfield Massachusetts
HACK SAWS BAND SAWS GROUND FLAT STOCK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YOURS FOR THE ASKING

This handy pocket-sized slide-rule type socket screw calculator gives diameters, lengths, socket dimensions, threads and drill sizes—in fact, everything you want to know when using UNBRAKO socket screw products.

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Knurled Head Cap Screws | Self-Locking Set Screws | Flat Head Cap Screws | Shoulder Screws | Dowel Pins | Button Head Socket Screws

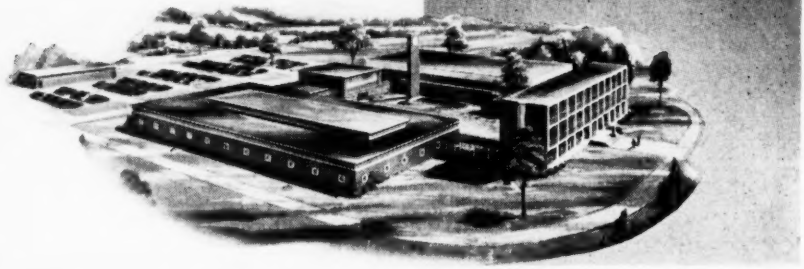
1 The year 1933 marked many automotive design and production advances. Among those on the production front was the first Detroit Broach tooling to broach connecting rods . . . an important advancement in terms of increased production, lower costs and better quality . . .

2 During the later thirties Detroit Broach continued to contribute to automotive broaching advancements. One example in 1938 was Detroit Broach tooling which made possible the complete finishing of main bearing caps cast in one piece in two passes . . .

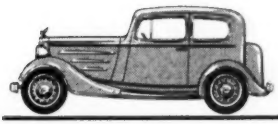
3 In the war years, the auto industry turned to war material and to Detroit Broach for the broach tooling for hundreds of parts. Typical was broach tooling to produce the rifling in gun barrels in a single pass and multiple-surface broaching operations on other gun parts . . .

4 Detroit Broach has continued to serve the auto industry in the post-war years. Tooling to broach differential cases, hinges, automatic transmission parts and innumerable other parts is helping to hold the line on rising production costs.

TODAY, automation has been introduced by Detroit Broach as an integral part of broach tooling. Parts are fed to, and carried away from, automatic broach tooling by specialized conveyor and hopper equipment. Tomorrow, too, one thing is sure . . . Detroit Broach will continue to pace the giant auto industry's need for better, more efficient production machining.

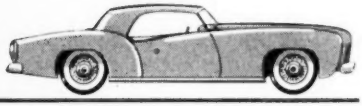


This is a view of the plant of the Detroit Broach plant and [illegible] in Rochester, Michigan — just outside Detroit. Designed by Saarinen, eminent Swedish architect, it embodies many important advancements that contribute to employee morale and manufacturing efficiency. Another example of the unusual facilities of Detroit Broach Company.



Broaching Pioneers

IN THE AUTOMOTIVE INDUSTRY



Master of mass production techniques, producing at a level where pennies per piece mean thousands of dollars per year, the automotive industry was among the first to recognize the economies of broaching.

Early, too, came recognition of Detroit Broach ingenuity and reliability in the design and manufacture of tooling that would pace production requirements. A small sample of that tooling is shown at the left.

in YOUR industry, too you will find many companies who rely on Detroit Broach to meet their needs for tooling that slashes cost-per-piece, boosts output and provides consistent and repetitive top-notch accuracy.

Detroit Broach engineers, Detroit Broach facilities, in fact the entire Detroit Broach team, are all keyed to one specialized skill. That skill is broaching. It is such specialization that has resulted in many of broaching's greatest advancements.

It will pay you, too, to have a talk with the Detroit Broach representative in your area. You will doubtless find many ways to lower the boom on rising production costs on present as well as proposed operations.

Detroit Broach **COMPANY**

ROCHESTER, MICHIGAN

Offices in Principal Cities Throughout the World

FORMS SMOOTH NEAT BENDS

Quick and Easy

View of Pines Semi-Automatic in large aluminum plant bending extruded automobile window frames. Output easily meets production line capacity.

PINES Hydraulic SEMI-AUTOMATIC BENDER

FOR PRODUCTION, SHORT-RUN AND MAINTENANCE JOBS, *YOU'LL LIKE THESE PINES FEATURES*

1 Simple Tooling — provides an efficient, economical method of handling a variety of work not adaptable to fully automatic equipment.

2 Safe, Dependable Accuracy — smooth, adjustable hydraulic power forms neat bends, assures uniform results, cuts scrap losses.

3 Easy to Set Up and Operate — simple tooling adjustments, easy toggle clamping, push-button operation, convenient hand wheel for angle-of-bend selection.

4 Saves Floor Space — compact, self-contained hydraulic unit includes motor, pump, reservoir. Occupies less floor space — 3′ x 7′.

SPECIFICATIONS

- Std. Max. Capacity — 1″ O.D. 16-ga. steel tube.
- Max. Rad. of Bend — 8½″ to centerline.
- Tube Lengths — up to 5 ft. std. (Provision for longer lengths if required).
- Speed — 29 rpm.
- Working Height — 35″.
- Motor — 3 hp.
- Pump — 7 gpm.
- Optional — Adjustable gauges, mandrel for critical bends.

Write **For More Facts...**
Get full details on this dependable, economy-model Pines Bender designed to handle a variety of pipe, tube, bar, and extrusion bending work at speeds up to 300 bends per hour.

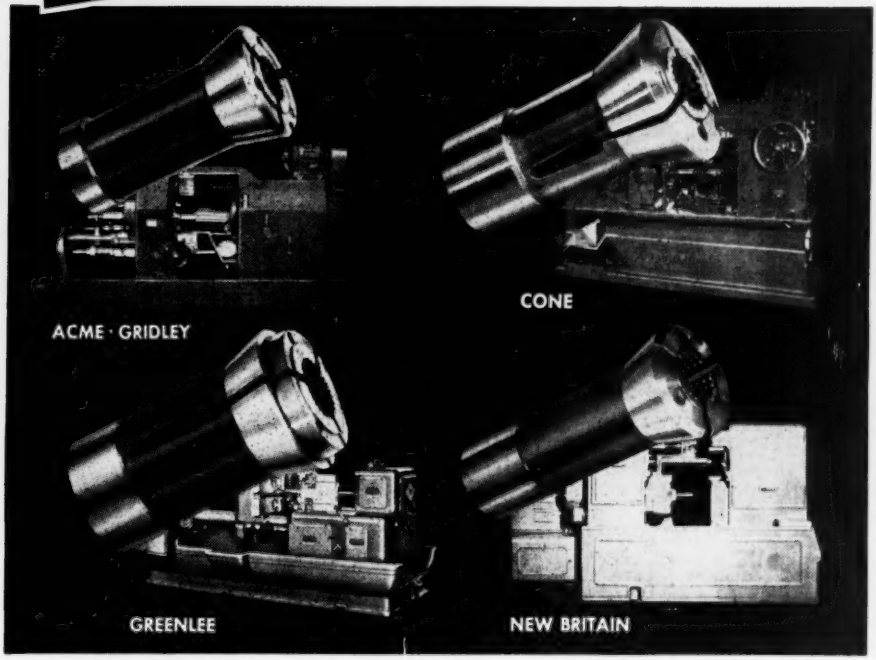
PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

BENDING · DEBURRING · CHAMFERING · THREADING MACHINERY

643 WALNUT
AURORA • ILLINOIS

HARDINGE ELMIRA, N.Y. Master Collets and Pads for MULTIPLE SPINDLE AUTOMATICS

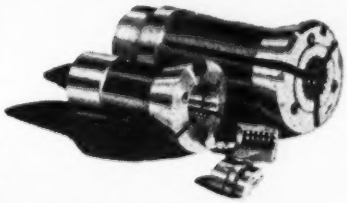


Equip your multiple spindle automatics with HARDINGE Master Collets and Pads—for solid collet performance at low cost.

Available for the following machines up to and including 3½" capacity: Cone; Greenlee; Gridley and Acme-Gridley; National Acme and New Britain.

- Size changes permitted without removing collet from Spindle.
- Final tightening possible for pads when closed on bar stock.
- Lower cost - compare pad price with solid collet, and you will standardize on Hardinge Style "S".
- Design affords maximum strength.
- Greater accuracy — because pads are ground accurately on an arbor.
- Lower inventory possible — pads interchange among different makes of automatics with similar capacity.

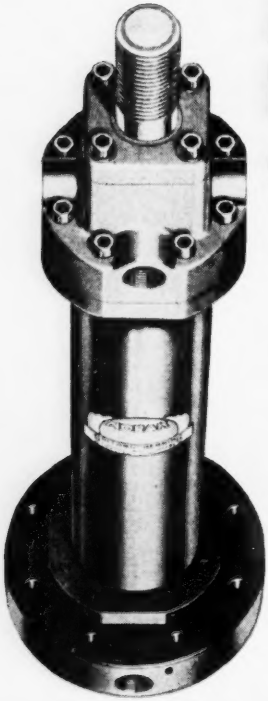
Hardinge Style "S" Sure Grip Master Collets and Pads



Write for Style "S" Bulletin—contains complete descriptions, specifications, and ordering information.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"



Proved in Service . . .

NOPAK High Pressure SERIES 1500 Hydraulic Cylinders

The successful design, construction and application of high-pressure hydraulic cylinders, under a wide variety of working conditions, is the result of specialized knowledge based on years of experience in the field of high pressure hydraulics, carefully selected materials, special skills and fine workmanship.

Reports from users indicate that NOPAK Series 1500 Hydraulic Cylinders have established new standards of design, precision, construction and performance in the high pressure field. They have been "Proved in Service".

NOPAK Series 1500 High Pressure Hydraulic Cylinders are available in 5 Standard Mountings, in diameters from 1½" to 8", in Adjustable Cushion or Non-Cushion Types.

GALLAND-HENNING NOPAK DIVISION • 2758 S. 31st St. • Milwaukee 46, Wis.

Representatives in Principal Cities

•

For Technical Data on NOPAK Valves and Cylinders, refer to Sweet's File for Product Designers, or write for Bulletin SW-2.

•

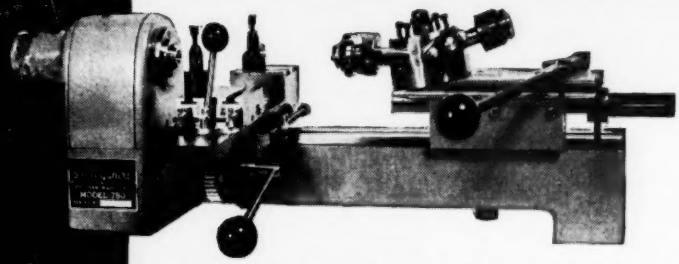
NOPAK

VALVES AND CYLINDERS

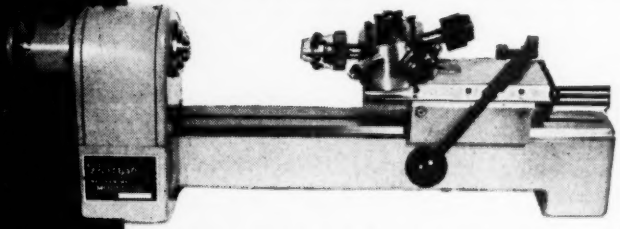
DESIGNED for AIR and HYDRAULIC SERVICE

A 7499-½-IAA
September, 1953

DERBY LATHE Model 750



Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Double Compound Slide Rest, Pt. No. 3652 and Six-position, self-indexing and semi-automatic Turret, Pt. No. 3610.



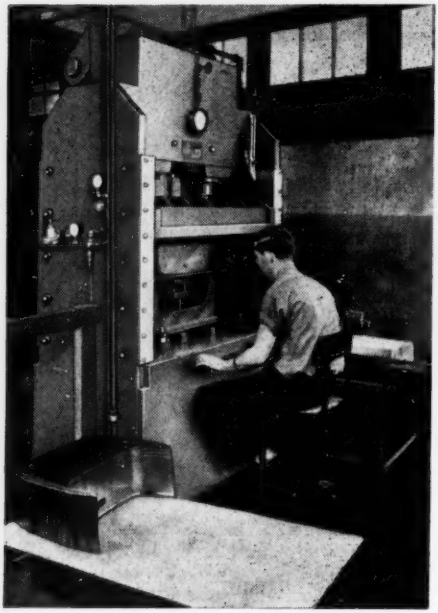
Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Six-Position, self-indexing and semi-automatic Turret, Pt. No. 3160.

SPECIFICATIONS

Overall Length With Lever Chuck Closer 25"	Distance between Centers.....12"
Length of Bed .....22"	Center Height .....2.953" (7.50 cm)
Height to Top of Headstock 8½"	Maximum Collet Capacity .....315"($\frac{8}{16}$")-(No. 80 metric)
Height to Top of Lathe Bed 4"	Maximum Spindle Speed .....18,000 RPM
Width of Bed .....2⅞"	Concentric Running of Ball Bearing Headstock Spindle ..... .0002"
Width of Ways .....1-13/16"	Spindle Speeds with Variable Speed Drive:
Swing over Bed .....5.905"(15 cm)	With Pulley Ratio 1 to 1..... 600 to 5,000 RPM
Swing over Compound Slide Rest .....2⅜"	With Pulley Ratio 2 to 1.....1200 to 10,000 RPM

F. W. DERBYSHIRE INC.
157 HIGH ST. • WALTHAM, MASS.

KRW PRESS PRODUCES 200-250 PIECES PER HOUR 12 HOURS A DAY FOR 2½ YEARS!



AND IT'S STILL GOING STRONG!

The headline tells the story! What more can we say? This KRW 150-ton Hydraulic Press is a mighty valuable piece of equipment at Liberty Steel Chest Corp., Rochester, N.Y. It's a motor-driven, 2-cylinder Press used for forming and deep-drawing work on tool and tackle boxes and roaster parts. Here is one more example of the rugged service and versatility you get in KRW Hydraulic Presses.

Let KRW help you with your pressing problems. Our engineers can show you how to save time and money in your shop with a KRW Hydraulic. We have a complete line of one, two and three cylinder models; 25-150 Ton capacities; hand, air or motor driven. KRW Presses are all self-contained above ground and give you maximum tonnage at any part of the stroke.

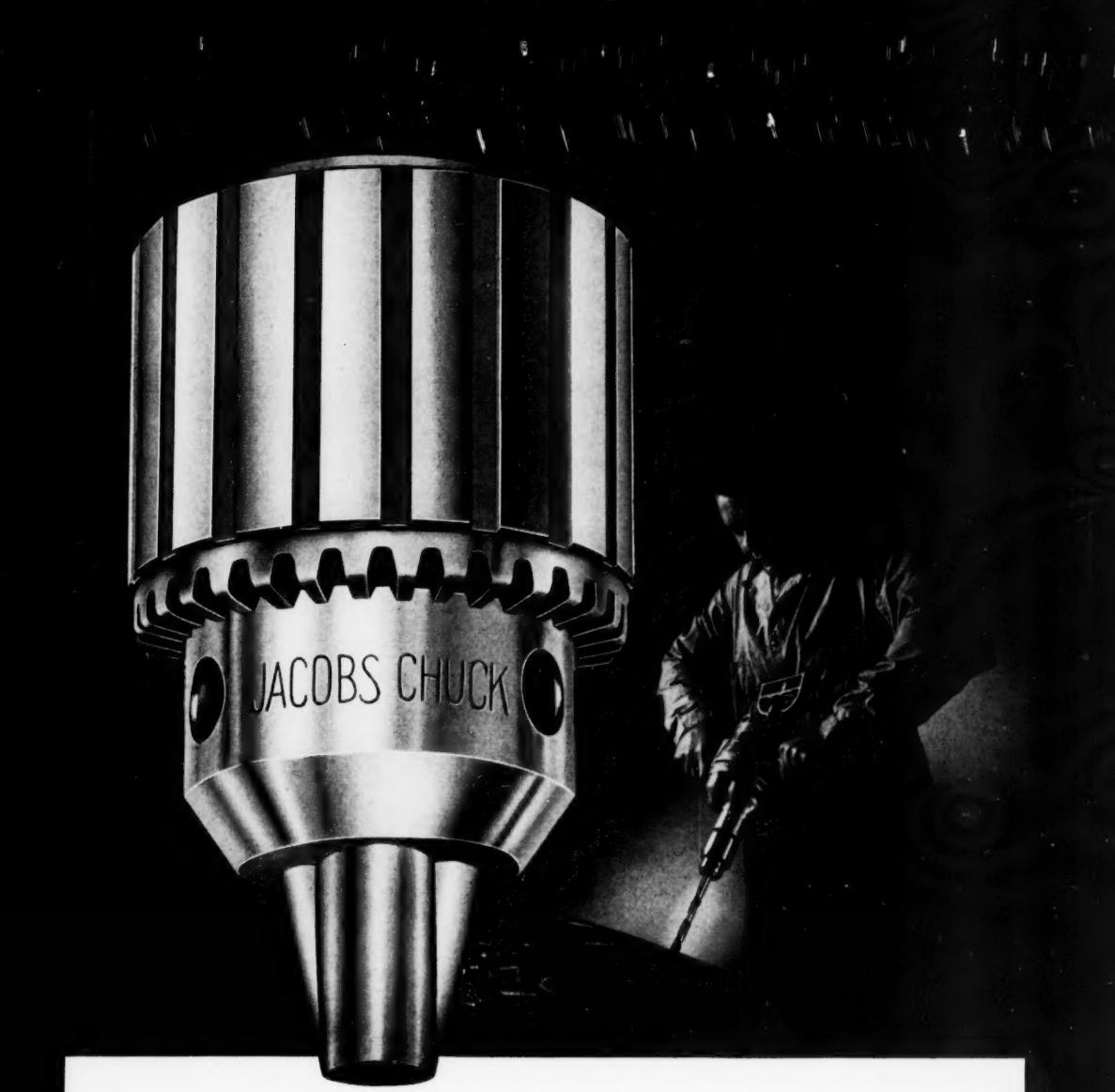
• Write for free illustrated brochures with detailed specifications and prices. Dep't. 16.

Maximum size Bed and Platen on 100 and 125 ton models—40" x 60"; on 150 ton models—36" x 60".

K·R·WILSON

215 MAIN ST., BUFFALO 3, N. Y.

Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!



TIGHTEN YOUR GRIP ON PRODUCTION

Production flows faster and smoother when your machine tools are equipped with Jacobs Chucks.

Rugged construction, great gripping power and accuracy have made The Jacobs Plain Bearing Drill Chuck the choice of machinists throughout the world.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A JACOBS IT HOLDS

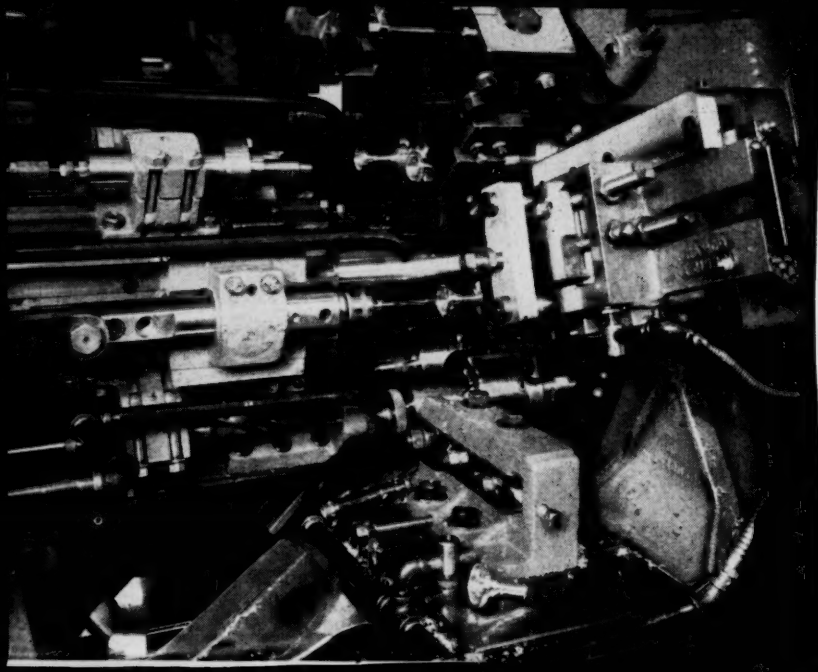
Jacobs and your local distributor

are ready to deliver the chucks you need and the service you deserve.

. . . first in chucks

. . . first in service

more operations on the same machine....

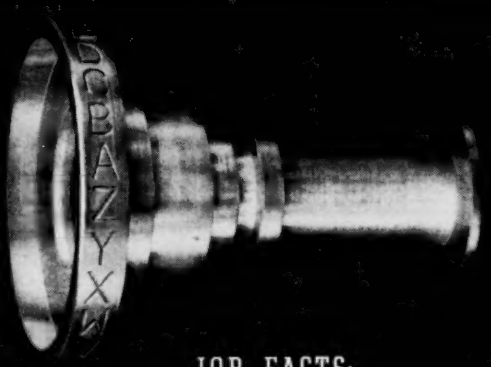


to reduce rehandling costs

The stencilled letters on this piece are now done by a geared attachment operating in one of the regular tool positions on a Standard Acme-Gridley 6 spindle Bar Automatic. Previously, this "extra operation" had required rehandling the piece at an added investment for machine, floor space and costly operating man-hours.

This example again emphasizes two important advantages which have been developed to a singularly high degree in

Acme-Gridley **MULTIPLE SPINDLE BAR AUTOMATICS**



JOB FACTS:

PART: Type Guide Wheel.

SIZE: 1 5/8" dia. x 1 7/8" long.

MATERIAL: 24S-T aluminum rod.

OPERATIONS: 19 operations on 6 outside diameters, 5 inside diameters — including geared type stencilling attachment, reaming and shaving attachments for fine finish all over.

TOLERANCES: on second shoulder behind stencil section .0005; on 5/16" reamed hole entire length of piece, .001.

MACHINE TIME: 17 seconds, 212 per hour, on 2" six spindle Acme-Gridley Bar Automatic.

ADAPTABILITY—basic machine design provides for simultaneous use of a wider variety of tools and attachments than found in any other bar automatic.

TOOLING INGENUITY—alertness to conceive new attachments and tools arranged in more combinations to perform more operations, backed by an unmatched experience in tooling more than 45,000 Acme-Gridley automatics—eliminates work rehandling costs.

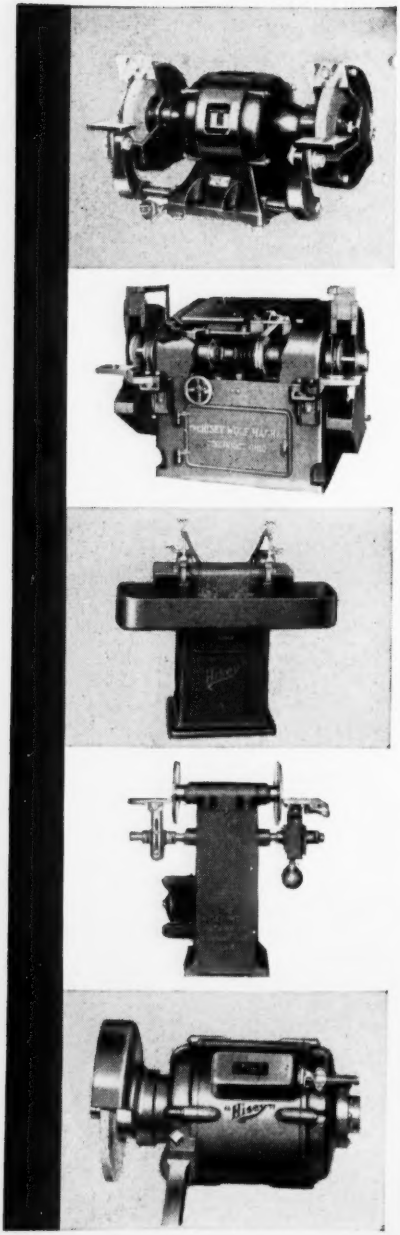
Ask Acme-Gridley tool engineers for modern tooling recommendations—then compare for *time* and *costs.*

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle — Hydraulic Thread Rolling Machines — Automatic Threading Dies and Taps — Limit, Motor Starter and Control Station Switches — Solenoids — Contract Manufacturing

Remember—Industry can't do **TODAY'S** job . . . with **YESTERDAY'S** tools . . . and be in business **TOMORROW**



. . . . . and they lived happily ever after

That's the way the story ended when you were a kid. It can still end that way if you select "HISEY" for that long tough grind.

Long, trouble-free service is the prime consideration in Hisey Grinders. It starts at the drawing board and continues through all manufacturing operations right up to final assembly. Blended with design favoring operators' convenience, "HISEY" Grinders are surprisingly competitively priced, making them the logical choice of large and small users alike.

The "HISEY" line is unusually complete comprising a wide range of sizes and types including Drill Grinders, Disc Grinders, Wet Grinders and others for various sharpening, snagging, finishing and fitting operations.

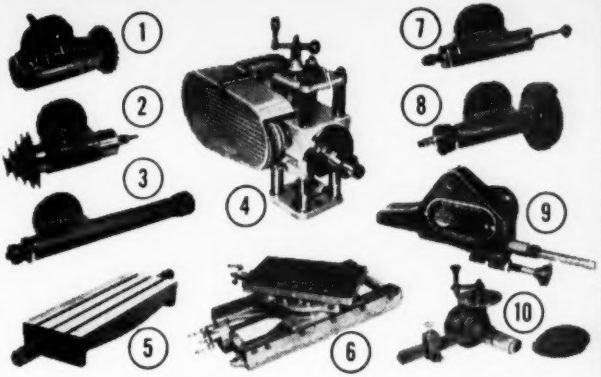
Write for Catalog 72-MG today!

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

master
MACHINE TOOL ATTACHMENTS

for
LATHES
TURRETS
MILLS

OR USE INDEPENDENTLY



1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

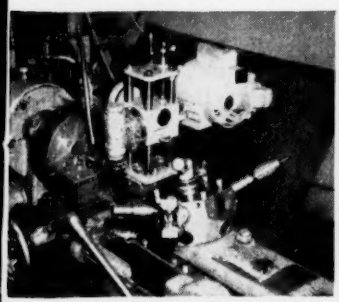
MACHINE TOOLS

THREE SIZES

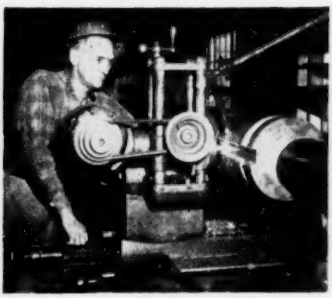
MODEL "C," ⅓ hp — 9" to 13" LATHES
MODEL "B," ½ or ¾ hp — 13" to 18" LATHES
MODEL "M," 1 or 1½ hp — 18" to 72" LATHES

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and experimental shops, as well as production. thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

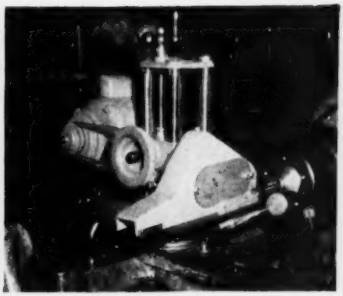
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2½" keyway in 9⅞" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway

FREE

WRITE FOR NEW ILLUSTRATED 24-PAGE CATALOG

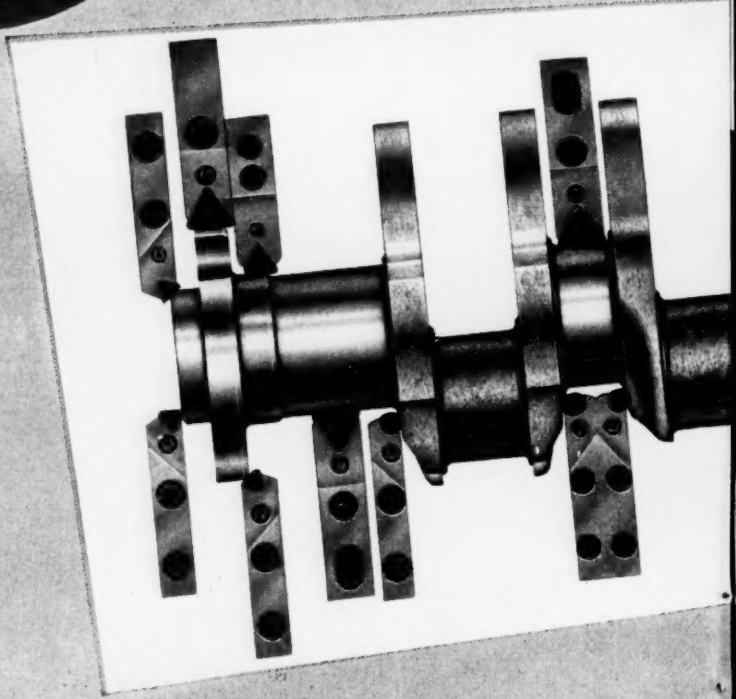
MASTER MANUFACTURING CO.

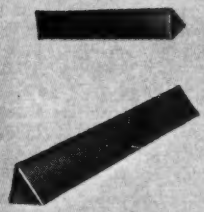
1310 EAST AVENUE A ▪ HUTCHINSON, KANSAS, U.S.A.

WESSONMETAL
TUNGSTEN-CARBIDE

WESSON TOOL HOLDERS

First.





Wessonmetal—the cemented carbide giving users phenomenal performance throughout industry—turns to new successes on this difficult crankshaft turning job.

OUR 30th YEAR IN CARBIDE

WESSONMETAL

WESSON METAL CORPORATION
LEXINGTON 34, KENTUCKY

TO TURN CRANKSHAFTS

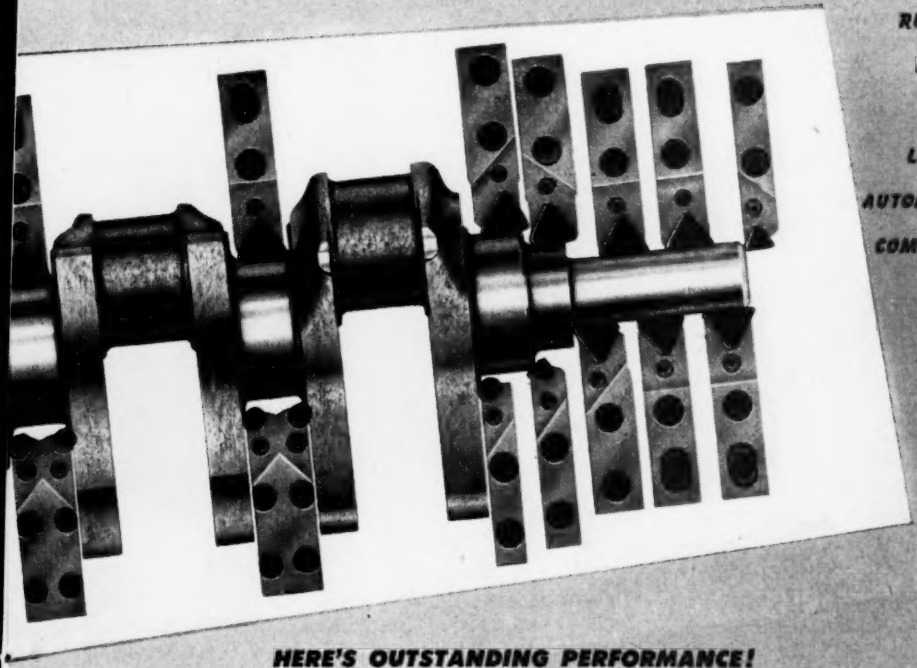
with CARBIDE INSERT TYPE TOOLS

USING WESSON BAND TYPE TOOL HOLDERS

and WESSONMETAL SOLID CARBIDE INSERTS

ON LeBLOND AND WICKES LATHES

NOW RUNNING AT ONE OF THE LARGEST AUTOMOTIVE COMPANIES



HERE'S OUTSTANDING PERFORMANCE!

AN AVERAGE OF 9000 PIECES PER INSERT BEFORE SHARPENING

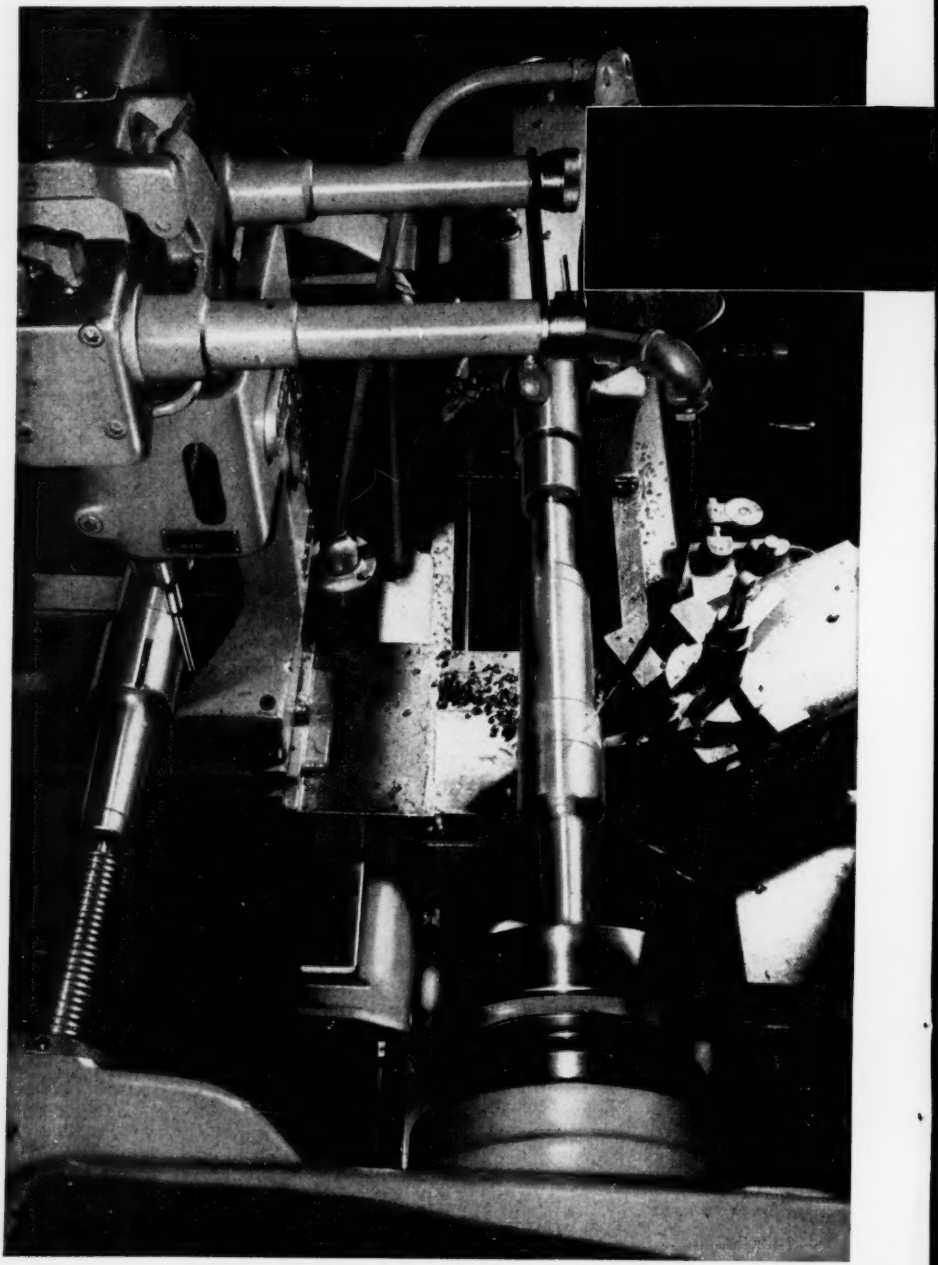
OLD METHOD	
Pieces	11 per hour
Cycle time	1 min. 55 seconds
Cranks per tool change *(average)*	1.7 pieces

NEW WESSON METHOD	
Pieces	48 pieces per hour
Cycle time	40 seconds
Cranks per tool change *(average)*	1500 pieces

WESSON COMPANY

1220 WOODWARD HEIGHTS BLVD. • FERNDALE (DETROIT 20), MICH.

WRITE FOR *Complete Story* with DRAWINGS



Lodgeical Choice For More Production

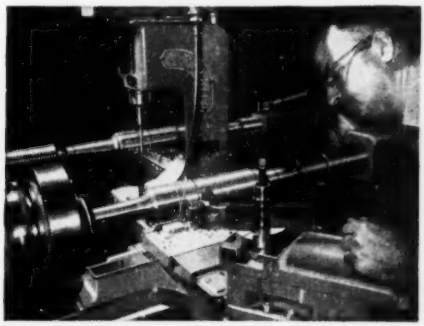
... The COPYMATIC Lathe

50% Time Savings at Temco Aircraft Corporation, Dallas, Texas

To production men and top management, too, the really significant fact in COPYMATIC case histories is the time saved. These substantial savings mean that older lathes can be replaced profitably because the new COPYMATIC pays for itself promptly.

For example, in the illustrations is a typical job at Temco Aircraft Corporation, Dallas, Texas. A roll mandrel of cold rolled steel is being turned to 2.000" diameter and #5 Morse Taper using a carbide tool. The COPYMATIC saves "50% of the former time, is easy to set up . . . very accurate (within .0004)!"

More comprehensive case history data on this and other COPYMATIC installations is available on request. Even a casual study of these facts may suggest ways you too can save time and money. Write for new catalog No. 216.



THE Lodge & Shipley COMPANY

3057 COLERAIN AVE. CINCINNATI 25, OHIO

over the editor's desk

A Symbol of Modern Production

EVEN though we have pledged unfaltering allegiance to the written word during most of our working life, we have been forced to admit on more than one occasion that we harbor a profound respect for symbols. While an ordinary writer must resort to dozens or hundreds or even thousands of words to define or describe an idea, a theme, a movement, or the like, one well-conceived symbol—in a single unmistakable impression—tells the entire story. We feel that this is especially true of the pushbutton symbol which supplants, for the first time in twenty-five years, an advertiser's message on the cover.

Many excellent suggestions for a front cover design were presented during the preparatory work on this issue, but none seemed to so explicitly illustrate the theme "More Production Through Modernization" as the symbolic pushbutton design. It is, we feel, a symbol of the mechanized age in which we live. Further, it is a symbol of vigorous action to find better ways of doing today's mechanical work. More specifically, it is a symbol of the modern trend in our factories toward automation, toward greater production through the use of newly designed tools, the latest equipment and methods.

You see, as a writer we've gotten off to a nice start on a lengthy treatise explaining the significance of a pushbutton. And that is not as it should be. So with affectionate respect, we will slip the cover over our typewriter, gracefully bow to the pushbutton symbol . . . and let it speak for itself.

"CATERPILLAR"

"American"

A coalition of outstanding "name" products dedicated to the interests of industry.

Here is a "Caterpillar" Diesel DW20 Tractor with W20 Wagon loading heavy clay for the Garza-Little Elm Dam near Lewisville, Texas.

The astonishing ease of operation of these units due to their ultra-modern design makes the "load" lighter and the cost lower.

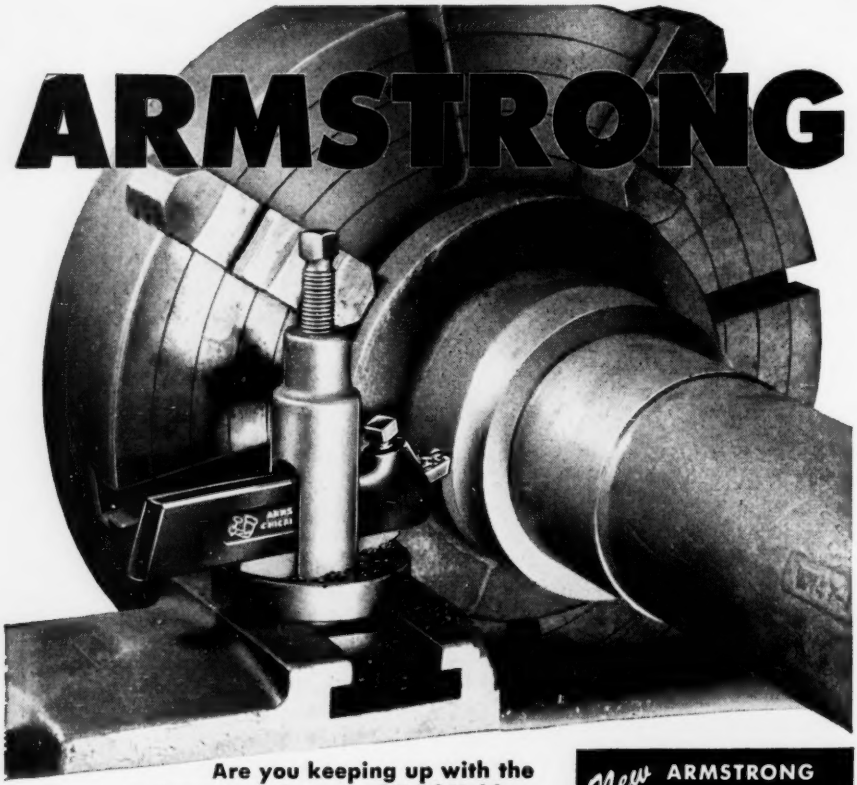
For the very same reason "Caterpillar" uses many "American" Radials. Because of their ultra-modern design they make the drilling, boring and tapping "load" lighter in "Caterpillar" plants and keep the cost of production at a minimum.

Extra power, centralized control, boring mill type spindle and extra fast tapping are outstanding virtues of "American" Hole Wizard Radials which swell the operator's pay envelope and help keep production on a profitable plane.

Precision work, better work and lower cost work, get [illegible] "AMERICAN".

THE AMERICAN TOOL WORKS CO. Cincinnati, Ohio U.S.A.

ARMSTRONG



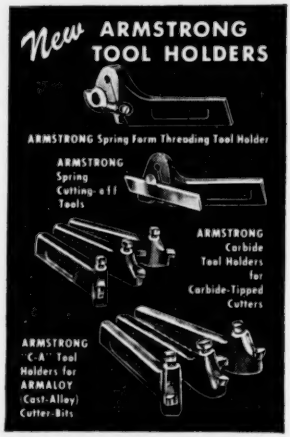
Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

WRITE FOR CATALOG


New ARMSTRONG TOOL HOLDERS
ARMSTRONG Spring Form Threading Tool Holder
ARMSTRONG Spring Cutting-off Tools
ARMSTRONG Carbide Tool Holders for Carbide-Tipped Cutters
ARMSTRONG "C-A" Tool Holders for ARMALOY (Cast-Alloy) Cutter-Bits

ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"* 5228 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

MODERN Machine Shop

Vol. 26, No. 4
SEPTEMBER, 1953

features in this issue

Section I

Between pages 122 and 146 of this anniversary issue, you will find thought-provoking discussions on the subject of modernization prepared by men who speak with authority based upon long experience in the metalworking field. These discussions cover such vitally important subjects as the practicability of machine tool replacement, a check list that will serve as a helpful guide in any modernization program, the timeliness for purchasing new tools and equipment, the advisability of adopting the latest improvements in manufacturing methods, the need for revising the Internal Revenue Department ruling affecting machine tools and equipment, and the use of a "projected profit and loss comparison" which is designed to serve as a replacement and modernization planning guide.

Contributors to this Section are as follows:

Swan E. Bergstrom, President
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The Warner & Swasey Company

Ralph E. Cross, Exec. Vice-Pres.
The Cross Company

Section II

Between pages 154 and 212, you will find many typical examples of modern manufacturing techniques that have enabled the companies who have adopted them to increase their production. These typical examples were obtained from various types of industries such as aircraft, automobile, machine tool, and so on.

Section III

Between pages 218 and 270, you will find detailed descriptions of many special tools which have been designed primarily to enable manufacturers to obtain increased production. These special tools clearly demonstrate the effort which many tool and equipment manufacturers are making to supply the latest and best equipment in the metal-manufacturing field.

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Anniversary Feature

ON the following pages are thought-provoking discussions on the subject of modernization prepared by men who speak with authority based upon long experience in the metalworking field.

through modernization

Modern Machine Tools and Increased Productivity

By SWAN E. BERGSTROM*

Case histories give positive proof that modern tools provide more production.

WITH the return to the free enterprise economy promised by the new Administration, manufacturers are again encountering the type of intense competition that prevailed before World War II. To meet this competition, industry must reduce manufacturing costs. With labor rates at a record high, cost reduction is a must if industry is to achieve the volume production that permits competitively priced goods. In the light of this situation, I believe this country is entering an era of productive advancement unparalleled in its history. And now, more than ever before, machine tools are the force to make this productive advance possible.

Swan E. Bergstrom

In general, there are two methods of reducing manufacturing costs open to industry. In some instances, basic product design can be simplified to reduce the amount and grade of material, and to eliminate some of the processing costs. This is a good solution, as far as it goes. But in the majority of cases it is difficult to institute a redesign program sufficiently drastic to bring costs down to competitive level. Or if such a program is possible, it often impairs the quality or marketability of the product. As the sole solution to a cost reduction problem, redesign is usually unsuccessful.

There is, however, a second and exceptionally sound method open to industry; the replacement of less profitable, out-dated equipment with the latest design machines. This second method not only reduces overall manufacturing costs, but also enables industry to pay today's higher hourly wages and material costs. In the long run, this is the only practical approach to the problem of increasing production while maintaining unit costs at an economic level.

* President, The National Machine Tool Builders Association; Vice President, The Cincinnati Milling Machine Company.

The equipment engineer of one of the largest and most prominent American companies stated that, in his opinion, his company had realized an average increase in productivity of at least 40 per cent on new machines installed. Conservatively speaking, we of the machine tool industry know that production can be increased from 25 to 33-1/3 per cent by replacing obsolete machine tools with models of recent design.

Increased productivity is not, of course, the only yardstick for measuring the benefits of an intelligent replacement policy. In many cases, one machine tool of current design will replace two or more out-dated models. When this happens, there are the further advantages of a lower capital investment and a saving in floor space.

In each specific instance of replacement, there are other benefits to be considered. These additional benefits can be measured in terms of the following:

1. The ease with which close limits can be obtained.
2. The convenience of operation.
3. The elimination of costly handwork.
4. The reduction in down-time for maintenance.
5. The increase in cutter life between sharpenings, and the general economy in tool costs.
6. The combination or elimination of separate operations.
7. The simplification of the operator's duties which may enable him to run more than one machine.
8. The reduction of scrap.
9. The ability to take heavier and smoother cuts more rapidly.

Perhaps the advantages of this second method of reducing manufacturing costs can best be emphasized with a few examples. The case of the automotive cylinder head is a good illustration.

Forty-two years ago 162 machines were required to machine the four flat surfaces on 108 cylinder heads an hour. The direct wage cost per piece was $.40, and the total machine investment was $243,000.

Seven years ago, improved machines and cutting tools had advanced this job so that the same output was achieved with six machines. The investment was slightly less, and the labor cost per piece had been cut in half.

Today, this battery of machines is outproduced by just one horizontal broach. When this new machine was installed it brought the capital investment down to $230,000, and reduced the direct labor cost to less than $.04 per piece. This reduction in cost from $.40 to $.04 is truly amazing when we recall that it took place during a period of declining money value.

Other examples of the increased productivity of post-war designed machines can be found in every field of metal-working. At a machinery plant, for example, a new machine replaced an obsolete model on the precision boring of wrist pin and crank ends of compressor connecting rods. The new equipment increased production 300 per cent. Scrap, which previously amounted to as high as 24 per cent, has been practically eliminated. The new boring machine paid for itself in eight months' operation.

In the machining of cast iron gear

blanks for textile machines, three new automatic lathes replaced eleven out-dated models. The new machines cut the time per piece from 7.19 minutes to 1.1 minutes. Direct labor and scrap savings alone have resulted in a 92.3 per cent annual return on the investment.

At another plant, five new automatic internal grinders were installed to replace twelve obsolete semi-automatics being used for precision grinding operations on small parts. The twelve old machines required six operators to obtain a production of 250 pieces per man hour. One operator can run the five new machines. The production rate on the new machines is 1500 pieces per man hour.

With the installation of a single tool, tracer-controlled l a t h e , one manufacturer cut the turning time on shafts from 8 hours, 15 minutes to 2 h o u r s , 20 minutes. That amounts to more than a 250 per cent increase in productivity over that possible with the obsolete, multiple-tool machine on which the operation had been done previously.

Prior to the installation of two new fixed-bed type mills, a manufacturer of hack saws had been cutting the blade teeth on two out-moded knee and column milling machines. A skilled operator could produce about 700 blades per hour on the old equipment. Due to chatter, the finish was poor, and minute burrs were left on the edge of the teeth. The two standard fixed bed machines jumped production to 3850 blades per hour. Chatter was eliminated, finish has improved, and the blades were free of burrs.

These are not isolated instances. On the contrary, they are typical of the increased productivity obtainable with recently designed machine tools. Similar examples can be found in every metal-working field—on general purpose machines as well as on production equipment. The application of post-war recently designed knee type millers, for example, is cutting [illegible] production time from 10 to 50 per cent on small lot machining in the average shop.

At the present time, the greatest bulk of America's production comes from out-dated machines. A large percentage of the 1,800,000 to 2,000,000 machine tools in this country are ten years old or older in design or in actual years. Over 1/3 of them are at least 20 years or older in design or actual years.

As I remarked before, an average increase in productivity of from 25 to 33-1/3 per cent can be obtained by replacing obsolete equipment with new design machine tools. It seems evident, therefore, that in an intelligent replacement p o l i c y American industry holds the key to a productive advance unequaled in its history. Modernization is the road to increased productivity and to a renewed advance in America's standard of living.

Are You Feeding a Herd of White Elephants?

By Howard Campbell

It is said that when an Eastern potentate wishes to take a polite way to ruin one of his subjects, he presents the offending subject with a white elephant. The recipient of the gift dare not sell or give

away his ruler's present, and as the white elephant is sacred, he dare not kill it. So he has to feed it as long as he has anything left that can be converted into hay for the elephant.

It is safe to say that there is hardly a machine shop in the country that is without one or more "white elephants" in the shape of machine tools that have outgrown their usefulness. It may be a worn-out lathe, or an old slotter, or an antique planer, but whatever it is, if it is a machine tool of ancient vintage, it is a "white elephant" and is costing the owner more than he can afford to keep it. In many cases the owner knows that the old machine is taking up more room than it is worth and will deliver only a fraction of the production that could be obtained from a more modern machine, but when he looks it over he is impressed with the size of it—especially if it is a large machine such as a planer or boring mill—or is one of those individuals who save everything, regardless, because they might find a use for it sometime, and so he puts off replacing it and there it stands.

What he does not see, as he looks at that old machine, is that instead of being an asset, it is a liability. It is eating its head off in overhead, floor space, and maintenance. It will still run and perhaps deliver as much production as it ever did, to be sure, but that may not be enough. The East Indian's elephant will run, too, but no salesman for an American firm would think of starting across country on an elephant after an order. Not with competitors going after that same order in trains, fast automobiles, and airplanes. The elephant is just as fast as it ever was, but modern methods of travel have rendered it too costly. And the same applies to the obsolete machine.

The old machine is costing too much to operate because the same tasks can be performed easier, more accurately, and at much lower costs with more modern equipment. In many cases, work for which several machines of older design have been required could be handled on perhaps one-half or one-third as many modern machines and enough saving could be made in labor costs and overhead to pay a substantial part of the cost of the new equipment, besides releasing valuable floor space for other uses. It should be remembered that each additional machine not only requires an operator, but also entails expense in the way of power, light, tools, perhaps crane service, supervision, insurance, and maintenance for the machine as well as for the three first-named items.

Go through your shop today and make a list of your "white elephants"—machines that are eating up more in maintenance and overhead charges than they can earn, and that are losing money for you through slow and unprofitable operation. Then get figures on production with up-to-date equipment and find out what savings can be made and what it would actually cost to replace these "white elephants" with modern machines. You will find that it wouldn't cost so much, after all, and your plant will again be equipped to maintain a competitive pace.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.

Analyze Operations to Achieve More Production

By ROGER F. WAINDLE*

The author offers a check list which will serve as a helpful guide in any modernization program.

TODAY, the biggest strides in modernization are to be found in the reduction of human error in all processes and repetitive operations. Each time a variable caused by a manual operation is removed from a process, production is increased and the product becomes more uniform.

Roger F. Waindle

Methods

Many process improvements have been accomplished with the aid of design changes or material substitutions but a large percentage have been solely the result of improved production methods. Many examples of the ingenuity and inventiveness of the tool engineer have proved that a standard operation can be tooled to perform an operation in approximately one-fourth the time that was previously required. In some cases, the same operations when studied again from an entirely fresh viewpoint, have yielded additional production rates from four to ten times greater.

Automation

Automation has captured the imagination of the layman as well as the engineer. The consciousness of a better way to do things has accelerated greatly the strides in that direction. This improvement in thinking has been a constant process over some 20 years and in addition to improvements in standard machines whose cycles (or portions of cycles), are automatic, many special single purpose machines have been developed to the point where their rates of production and repetitive accuracy have attained goals undreamed of only a few years ago. Storage of parts between operations has become a thing of the past in many production lines.

Quality Control—Gaging

Automatic quality control is now employed effectively for assembly of components as well as production of

* President, American Society of Tool Engineers.

those components themselves. When assemblies require precision fitting, automation can achieve consistent results impossible to attain even with the most skilled craftsmen. Inspection gages as employed today will not be required in the future because automatic gaging will be built into more and more machines to gage the part and reset the machine as required. The development of standard control components, notably electronic, has reached a high stage of development. For most controls it is now only necessary for the tool engineer to know the characteristics desired and to match them with those of commercial units. In this way the tool engineer can devote his maximum to development of ingenious economical applications without undue attention to developing and testing the control elements necessary for these advanced control practices.

Teamwork

To effectively utilize the possibilities of modernization programs it is a *must* that teamwork be developed in all departments. This teamwork, achieved through understanding of mutual problems through adequate communication channels for interchange of information, is the cornerstone of progress. When it is fully developed there is practically no limit to which improvements and better production methods can be developed!

Material Standards

New materials and improvements in the quality of existing materials have helped importantly in improving production. Through continued research a wealth of information is available that can be utilized by the tool engineer who also understands materials. Although integrating materials knowledge with manufacturing processes is difficult, information available to the tool engineer will usually permit him to establish near-ideal conditions for processing without the need for extensive experimental tests.

Machining Rates

Many machinability studies that have been undertaken since the end of World War II prove that a large percentage of our plants are operating with obsolete methods and equipment. An increase in cutting speeds on many jobs above 500 surface feet per minute not only effectively increases production but also has been shown to produce better surfaces with closer size control. In order to effectively utilize all of the advantages of high speed machining, however, for many production operations will require corresponding improvements in tooling and methods. While these high speeds require increased rigidity and permit utilization of more power in tools, it is interesting to note that metal removal by these new high speed processes actually requires less horsepower per pound.

More Powerful Machine Tools

Within the last decade horsepower ratings for machine tools of the same physical size have generally increased about 50 per cent with resultant increased productivity per tool. This trend is still continuing so that now more work can be produced with fewer machines in less space and with fewer operators than

had been possible in the past. Where main drive motors were but a few horsepower at one time, they are now frequently 10 to 50 horsepower capacity; special machines are actually being designed and built with spindle ratings of several hundred horsepower, an inconceivable dream only a few years back.

Small and Medium Lot Manufacture

The big problem in modernization is always the economic consideration faced by the tool engineer when deciding on production methods for small and medium quantity lots. Tooling becomes a major item of the cost, and the extent of automation justified becomes critical. The more automatic an operation, the more the setup time becomes a governing factor in medium quantity production. Here the tool engineer must exercise more than ingenuity—he must have a clear and accurate judgment of costs for alternative methods.

Here is an outline "checklist" for today's manufacturer:

1. Your organization—is it geared for increased competition?
   - A. Study the entire productive setup—from raw material to shipping methods.
   - B. Recognize that labor will not be "cheap" in the immediate future and modernize equipment accordingly.
2. How can you obtain more production through modernization?
   - A. Examine your product. (1) Plan your study budget on the basis of the economics—the most expensive elements first. (2) Make an objective study of production redesign for better production.
   - B. Actually trace movement of the product through all steps of production *including* nonproductive functions of highly paid employees.
   - C. Study quick-changing jigs.
   - D. Study automatic, multiple station and transfer machines where production volume justifies.
   - E. Use preset tooling to minimize down time.
   - F. Group operations so that parts progress with less handling.
   - G. Know your production problems—then apply quality control to increase production and minimize scrap.
   - H. Gage quality at the machines—on the floor.
   - I. Investigate highspeed multiple point gaging equipment if 100 per cent gaging is required.
   - J. Provide adequate illumination and ventilation.
   - K. Be sure your maintenance force can keep your up-to-date equipment in an up-to-date condition.
3. Acquiring and using "know-how".
   - A. Open your mind to change and improvement. Try to think beyond standard amortization figures when considering new equipment.
   - B. Keep abreast of latest trends and new thinking by (1) active participation in technical societies; (2) devote a good portion of your time to studying editorial and advertising pages of technical journals; (3) maintain an open door to sales engineers; (4) get out

and visit other plants and industrial expositions.

C. With your Board of Directors, study machinery replacement formula and depreciation with an eye to what it will mean to you five years from now rather than this year!

Modern thinking plus modern equipment equals modern tooling.

Obsolescence

IT is said that the U. S. Patent Office is issuing approximately 40,000 patents a year. That means that at least 40,000 people have ideas for accomplishing something in a manner that is an improvement over the method formerly employed, either in the results obtained, or at a saving in either labor or materials. Add to this figure the number of new discoveries that are being brought to light every day by scientists and others, together with the changes in styles and methods of living, and the total will indicate one of the greatest menaces to modern business. That menace is Obsolescence! Obsolescence of product, and obsolescence of equipment with which to make the product. The product is obsolete when there is no longer a demand for it—when the manufacturer has failed to properly gauge the wants or necessities of his customers and has thus left an opening for a competitor to meet the demand. The equipment is obsolete when the cost of operation of such equipment is so high that the product can no longer be manufactured at a cost which enables the manufacturer to compete with others who have faster, better, and more accurate equipment.

Every live manufacturer is constantly watching the market to make sure that his product is as good or as cheap as that of his competitors, but how many are as constantly watching the equipment market for opportunities to make a larger profit or develop a larger market by selling at a lower price through the installation of better equipment? The 40,000 patents referred to above include hundreds covering easier and quicker methods of operating metal working machinery, most of which would undoubtedly return valuable savings to the user. In fact, the question of purchasing an improved machine often resolves itself into a question—not of whether one can afford to buy it, but whether one can afford to be without it.

No manufacturer who is machining one piece at a time on a plain milling machine can possibly compete with the manufacturer who is using a double head or continuous miller. No man who is boring, facing, and threading duplicate parts with a single-point tool can compete successfully with the owner of a modern automatic lathe, equipped with special tools. No tool shop where the dies are hand-filed to shape can produce at the same low cost as the shop that is equipped with modern die-filing machines. And these are just a few elementary examples of progressiveness in comparison with a lack of it which will sooner or later lead to obsolescence. Those who cannot or will not keep up the procession will eventually be left behind.

Obsolescence is just as much a menace in the plant as it is in the salesroom.

Industrial research laboratories once were considered a luxury, then a kind of insurance; today they are recognized as one of the essential ingredients required to keep our industrial corporations running.

—*Industrial Research Newsletter.*

Now Is the Time To Replace Old Tools

By THOMAS R. RUDEL*

Many indications point to present time as most favorable for purchasing new tools and equipment.

DURING the course of every business cycle, an advantageous buying period of purchasing, relative to the cycle, occurs. Rarely very obvious, this favorable purchasing period is usually not recognized until some considerable time after it has passed, much to the regret of those who intended to purchase advantageously, "when the right time comes." The metalworking industry of America may be passing through just such a period right now without recognizing it. Look at the American machine tool picture as it stands today.

Thomas R. Rudel

For well over two years, priorities as well as large government contracts have discouraged potential purchasers of replacement machine tools. While both of these deterrents to civilian retooling may shortly reoccur, today almost all impeding restrictions have been removed with the prices of most machine tools close to the level at which they were frozen at the time of the advent of the Korean conflict, and deliveries of most machine tool builders are virtually normal. Let us consider, therefore, the obvious advantages gained through immediate replacement of old tools.

Most of the machine tools being produced today have made completely obsolete their pre-World War II counterparts largely because the advent of two armed conflicts in thirteen years has resulted in highly accelerated improvements relative to both design and production. The advantages resulting from these improvements are available today to the purchaser of a new machine tool. Without the armed conflicts, it would have required at least twenty years additional time to bring machine tools to their present high state of productivity and modern design.

Most forward-thinking produc-

* President, American Machine Tool Distributors' Association; President, Rudel Machinery Co., Inc.

tion men readily admit that the continued operation of obsolete machine tools results in very low profits largely because wages have more than doubled since 1940 and taxes have also increased tremendously. High production, therefore, is the only answer to profitable operation. In our metalworking industry, high production is possible and available through the utilization of modern metalworking equipment.

Plant morale, another substantial factor in the creation of profits, inevitably rises when new and better metalworking equipment is installed. That better tools attract better workers is a well established maxim, and with the labor outlook remaining both scarce and highly paid, modern, easy-to-operate, high precision machine tools, seems the obvious answer to profitable operation in the present highly competitive market.

Specifically, three salient advantages characterize today's modern machine tool from that of its old predecessor. The use of new metals in the construction of both defense and peacetime products has compelled manufacturers to use higher speeds and feeds. Machine tool engineers have developed a much wider use of tungsten carbide as a cutting tool which has led to greatly increased production. Scientific research and a greater knowledge of the physical qualities of various metals has made it possible to machine parts at much higher speeds through predetermination of sonic factors and other physical elements pertaining to high speed production.

Modern machine tools have been designed to provide greater ease of operation thus making it possible for the individual operator to produce workpieces in greater quantities, with greater facility, and with considerably less margin of error. The operator is better able to see and gauge his work and is able to work to tolerances of a precision unheard of fifteen years ago.

Production methods themselves have changed tremendously in recent years, which changes all manufacturers can profitably utilize if they have the proper modern equipment to do so.

Castings and forgings are being produced today to tolerances which frequently require only a limited amount of fine machining and the machine tool industry has kept fully abreast of other metalworking operations, thereby integrating machine tool design to the modern developments in foundries and forge shops.

Developments in the materials handling field have also made it possible for plant operators to obtain greater utilization from the productivity potential of modern machine tools. Loading and unloading and transportation from one station to the next have been greatly stepped up, thus augmenting the efforts of machine tool engineers in their designs for higher production.

The metalworking industry confidently expects that some form of more rapid amortization will become law in the very near future. When this occurs, deliveries of new machine tools will again lengthen. The outlook of defense production is today controlled by so many factors beyond the prediction or knowledge of anyone that the present time ap-

pears to be the most favorable time in years for the purchase of modern machine tools and equipment.

Industrial activity remains high and looks as though it will remain high for a long time. Such a condition produces a high value for used machine tools in the secondhand market and presents an opportune time to trade. And this, too, is a rare phenomena in the machine tool industry, for usually when deliveries of new machine tools are relatively normal, values in the secondhand market are usually low.

Thus, today, most successful managers of metalworking plants, and especially those operating in a highly competitive field, are turning to modern machine tools, modern materials handling devices, and the latest of scientific developments in tooling and metal cutting in order to cut their costs, increase their production, and turn out better products to their own as well as their country's profit.

A Study of the American Economy

THE goods and services the American worker can buy with an average hour's pay can continue to rise in the coming decades, maintaining or bettering the last half-century's spectacular rate of improvement in American living standards, according to an exhaustive five-year study of wages and employment trends in this country made by the Twentieth Century Fund.

Estimating the probable future trend of national income, the size of the labor force, prices, technological advance, and other factors that, in a favorable economic climate, influence real wages, the authors of the study found that the American wage earner can probably increase the buying power of his hourly wages over the next decade or two at an average of 2.5 to 3 per cent a year.

The study gives a top place, among the factors on which this rising earning power of the American worker depends, to continuing, or even speeding up, the pace of technological advance in industry. New devices and methods of production, say the authors, are the main sources of higher productivity, that is, more output per hour of work; and rising real wages (their purchasing power), in turn, have a long-noted dependence on rising productivity. Therefore, a good set of basic equations for high wages, according to the study, is the following:

Rising real wages = increasing productivity of labor

Increasing productivity of labor = technological progress

Technological progress = labor saving devices, displacement of labor by machines, shifts in capital and labor force, continual challenges of economic pressure met by appropriate response

The study draws a clear picture of the relationships of wages, productivity and prices in the American economy, showing that if money wages as a whole rise faster than productivity, the price level is pushed up, canceling some of the gain to the worker. Wage earners as a group cannot increase their real earnings much faster than the over-all rise in the nation's productivity.

This does not mean that wages could be set by central authority, according to a formula based on productivity, or anything else. It is believed that collective bargaining between employer and employee, responsive to supply and demand and the bargaining power of the two parties, is the only basic wage-setting process that will work within our democratic traditions. The study notes, however, that recently both labor and management have been increasingly concerned with finding long-range policies to give some guidance in wage negotiations. The study points to the wage-productivity relationship as one such principle. Without precluding adjustment of particular wage rates, such a relationship would establish a point around which adjustments in wage rates should be clustered. Acceptance of this principle by both parties would change the psychological climate of collective bargaining.

Examining the broad range of the history and structure of American wages and employment, the study notes a number of striking facts, developments and trends, among them the following:

Employment of World War II veterans. The country's economy proved its strength when it found jobs for more than 3 million veterans by November 1945 and for nearly 13 million by November 1949.

Composition of the labor force. The long-range trends in the age and sex composition of the American labor force are shown by the increase in employment among females over 14, between 1900 and 1949, from 20 per cent to 32 per cent; the drop in the same period of employment among persons aged 65 and over, from 39 per cent to 27 per cent; and the drop in employment among those aged 14 to 19, from 45 per cent to 36 per cent.

Entrances and withdrawals of labor. Between 1,740,000 and 2,000,000 persons enter the labor market each year, mostly young people graduated from school, while about 1,500,000 workers die or withdraw permanently because of age or disability.

Seasonal turnover. During a year, on the order of 10 to 12 million persons who do not work regularly, take temporary jobs; while about 8 million of those with more regular jobs are out of work for short periods while ill, seeking other jobs, or for other reasons.

Employers. There are about 6 million persons or business establishments who hire labor at some time during an average year.

Farm dwellers with town jobs. Rural road building, the automobile and the spread of industry made it possible for one out of seven workers living on farms to work at a non-farm job in 1930, one out of five in 1940, and one out of three in 1949.

Hired help on the farm. American farmers and their families do about three-fourths of the year's work on the average farm; hired help does one-fourth.

Incentive pay. About one-fourth of all wage and salary workers in this country get their basic pay on some incentive basis: piece work, bonus, commission, and so on.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.

Examine Manufacturing Techniques to Obtain More Production . . .

By GEORGE H. SANBORN*

More profitable production is assured through adoption of latest improvements in manufacturing methods.

IT is undoubtedly true that, ever since the first production machine was put into use, there has been a never-ceasing effort to improve and supplement it. The inventive minds could come up with new ideas faster than machinery manufacturing capacity and limited funds could produce them. Some of those ideas were practical and others were not. Years of experience have proven which were the most valuable machines and methods. It has been learned which are the best types of equipment but the process of improving and originating will still go on.

George H. Sanborn

Manufacturing plant management wonders when to replace equipment, what to replace it with, and why. I am not going to try to answer these questions. Help has been offered by such associations as the Machinery and Allied Products Institute and the National Machine Tool Builders' Association but, actually, there is no hard and fast rule that can be used to govern all situations.

I would like to mention a few things that are being done to modernize machines and methods in the gear manufacturing industry in which I am proud to have a part. There are many operations between the preparing of the material and the assembling of the finished gear into an automobile, airplane, steamship, or any one of thousands of other mechanical items.

In turning the gear blanks there are faster, sturdier lathes available with various degrees of automation depending on the number of gears required of any single design. Tungsten carbides are becoming almost a must in some of these operations but in other gear operations tungsten carbides have not been found to be of any advantage.

The actual production of the gear teeth probably presents the greatest

* President, American Gear Manufacturers' Association.

field for modernizing study. No one method at present stands out head and shoulders above all others for producing all types of gear teeth. Most gear teeth are cut by some kind of tool which removes chips. This might be a generating method such as hobbing or shaping, or it might be formed by shaping or milling. It might be by grinding from the solid or following a previous roughing operation. Many gears are shaved after being cut by some other method.

The major improvements in gear cutting equipment recently have been to make gear cutting machines more accurate, with more rigidity, of higher speed and with more power. There is, of course, the addition of automation which I will treat separately.

The machine tool builders have learned to build more accuracy into their machines even though the general design of the machine may be practically unchanged. But beyond that, the extra rigidity and power give much improved cutting results. It permits higher cutting speeds and heavier feeds as well as producing greater accuracy with reduced wear on the cutting tool. This makes possible much better production with tungsten or moly high speed steel cutting tools where tungsten carbides are not practical to use.

The design of cutting tools also has improved in recent months in that various features are becoming available in combinations that have been considered impractical heretofore. This assists in reducing the cost of other operations.

Equipment for the grinding of gears has not changed materially in the last few years except for its adaptation to automatic and semi-automatic handling of the work. The work indexing and wheel truing mechanisms are, of course, always under a watchful eye as they are of extreme importance to this operation.

Gears of 20 pitch and finer are usually considered separately from the coarser pitches because the problems in producing them are quite different. This is true even though the same general types of equipment may be used. It becomes more a problem of technique as well as equipment. Techniques have been developed which produce fine pitch instrument gears to almost unbelievable accuracy at surprisingly low cost.

In order to produce modern gears to fit modern requirements it is not only necessary to have modern cutting tools but also modern inspection equipment. This type of equipment is expensive and ofttimes looked upon with disdain, as is most nonproducing equipment. Good gear inspection instruments are absolutely vital to good gear production. Modern instruments for checking gear profiles, spacing, helicity, pitch line irregularities, composite errors, and so on, are available. Through them has been eliminated the human element to a large degree, and loose pieces requiring extra handling and storage have been eliminated. Where pressure during testing has to be controlled, such as when checking the composite error of fine pitch gears, provision has been made for doing so.

Errors in gear teeth are measured in tenths of thousandths of an inch which are not easily plotted for

study. Modern instruments do automatically plot these errors on a graph and, in some cases, to various amounts of magnification depending on requirements. Magnifications of 800 to 1 or greater are available and necessary for some jobs.

Automation, or the automatic handling of the gears during a production machine cycle or between machines, is receiving a lot of attention these days. This sort of thing is practical only where large quantities of gears of a single kind are to be produced. It is possible today to have a gear blank turned, passed on through the various tooth cutting operations, and on to others without any manual handling.

The automatic handling of gears through the various operations not only reduces the production costs but gives a more uniform product. Gears handled in this manner should be more accurate and involve less scrap. Improper functioning of the automatic features can increase tool breakage but this sort of trouble is usually quickly remedied.

The automatic handling of gears has been proposed for many years but not until recently has it really "caught on." In the future, this method of handling will be employed in most cases or wherever it is practical to do so.

New techniques are being continuously developed in the heat treating of gears but the basic methods remain more or less unchanged. One recent development has been in the direction of using hot oils or hot salts for quenching to the end of reducing distortion in the hardened gears. This high temperature quenching does not eliminate distortion but has a tendency to reduce it.

There is no question in my mind but that it pays to keep a gear production department tooled with modern equipment. When old machines and tools should be replaced depends on many things such as amount of improvement, cost of new equipment, labor saving, floor space, tax situation, permissible amortization rate, and so on. Each case must, of necessity, be treated individually. Other production departments are undoubtedly affected similarly to the gear department. My best advice is to watch all of your production equipment. Don't let it "die with its boots on".

Feast or Famine

THUS far in our country's history, when there has been war, or threat of war, the machine tool industry was suddenly swamped with a volume of defense orders far beyond its capacity to produce; and then, after it had built up its capacity, the emergency had been met, and peace came again, the Government-owned machine tools purchased for the defense program were thrown upon the open market in competition with new machines built by the industry, forcing the industry into the doldrums. Then along would come another defense crisis — and the whole cycle would be repeated over again.

The main reason for this recurring picture is that the United States, in the past, has always thought of war or defense purely as an emergency proposition.

Today, however, our entire attitude has changed. We recognize that as far as we can see ahead today, national defense must be not an emergency but a continu-

ing program. This presents a series of problems new to our country.

Planning in Washington first took the line that we should build up large reserve stockpiles of the weapons of war—planes, tanks, guns, guided missiles, and so on—so that we would always be ready should an emergency arise.

But this plan presents serious difficulties—the chief one being that with invention and development proceeding as rapidly as they are, weapons built and stored today would be obsolete tomorrow, at the very time they were needed.

The alternate plan—one proposed by the Advisory Committee on Production Equipment, of which Harold S. Vance is Chairman — is that instead of building military end items, we should instead build and install, if possible, ready for use, the production equipment required to build the long lead-time items should an emergency arise.

This production equipment would consist, in large part, of machine tools. They would presumably be set up in stand-by plants operating on a limited basis, proving new designs, and ready to go into full-scale operation overnight upon threat of war.

The Vance Plan, as it is called, is a new approach to the national defense problem and will require for its adoption the approval of the Congress. One of its main advantages is that the savings to the taxpayers will be very large.

Meanwhile, as this whole situation is being studied in Washington, the cutbacks in defense production are continuing and raise an immediate problem in connection with Government-owned machine tools no longer currently required for defense work.

These machine tools are set up in contractors' plants. Since the work to be done on them has now been completed, they are in many cases in the way. What should be done with them?

Should they be shipped to Government warehouses and stored against a future emergency? World War II experience proved that this method is costly and of doubtful value. Entirely aside from the question of warehouse space, there is danger that stored machine tools may deteriorate, records get scrambled, parts get lost, and what is supposed to be a "reserve" may turn out in the end to have only a fraction of its inventory value. An example was the so-called "National Industrial Equipment Reserve" set up at the end of World War II.

Another course of action would be for the Government to sell these machines in the open market, in competition with new machine tools now being built by the industry. But this would lead to a recurrence of the situation which developed when this program was followed after World War II. The result at that time was to depress the industry to such a low level that it was utterly unprepared for the defense emergency which arose with Korea. And everybody is agreed that from the standpoint of military preparedness, the industry must be maintained at a reasonable rate of capacity.

If the Vance Plan were to be adopted, Government-owned machine tools not presently in use could be dovetailed into the Vance program of stand-by plant facilities.

There is no easy answer to this dilemma. However, the defense authorities in Washington are now fully aware of the direct relationship between machine tools and national defense—and now that the country is committed to a continuing defense program, it would seem likely that Washington will pursue a more constructive policy in this situation than it has followed during emergency periods in the past.

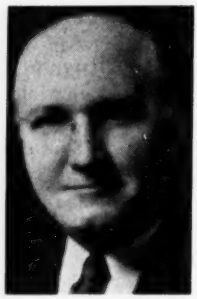
The Tax Brake on Modernization . . . .

By Lloyd D. McDonald*

Impetus for modernization dependent upon revision of Internal Revenue Department ruling.

IT has been generally assumed that because of our genius for production in this country, the productive equipment in our manufacturing plants is the finest and most modern in the world.

This assumption is contrary to the facts. We have lagged far behind various other countries in plant modernization. For many years the major share of metal fabricating work in the United States has been on obsolete, high-cost machine tools. Only under the spur of war, or a defense emergency, has modernization even begun to keep pace with advances in the art of cutting and shaping metal.



Lloyd D. McDonald

Why? The reason does not lie in any lack of new and better machines. The machine tool industry has constantly been developing new models which will do the work faster, better, and more economically.

The answer lies in the tax policies of the United States Government, particularly the Internal Revenue Department ruling with respect to depreciation allowances. Taken in conjunction with the Federal income tax, this ruling exerts a powerful brake upon modernization and is a contributing factor to creeping obsolescence.

Internal Revenue Department Regulation TD-4422 assumes that as long as a machine is operated, it is useful and profitable; and puts upon the taxpayer the impossible burden of proving that a machine will be worn out, or become obsolete, at some precise time in the future.

Since the user of the machine obviously cannot furnish such proof, the Bureau of Internal Revenue, in its Bulletin "F", has arbitrarily decreed that certain types of machine tools have certain lengths of life upon which depreciation schedules are based. According to the Bureau, a turret lathe has a life of 25 years, a milling machine a life of 20 years, a planer a life of 25 years, and so on. The average for machine tools in general is a little over 20 years.

* Executive Vice-President, The Warner & Swasey Company.

In actual fact, however, new machine tool models usually render old ones obsolete within, to say the least, 10 years. A machine older than 10 years may have a "useful and profitable" life for certain types of work; but by and large when a machine tool is 10 years old, it is time to do replacement arithmetic from the standpoint of cost and productivity. In many cases such arithmetic will show that replacement is imperative.

But now let us see what happens. Let's take a hypothetical case.

A company has, let's say, a certain machine tool for which it paid, ten years ago, $10,000. Under Bulletin "F" this machine has a 20-year life. The company has therefore recovered, through depreciation allowances, $5,000 of the capital which it originally invested in this machine.

It wants to replace the machine because it has had heavy duty, it has started to wear out, and furthermore it is obsolete—a new and better model is available.

The new model costs $18,000. The difference in price is due in part to inflation over the 10-year period, and in part to the fact that the new model is a greatly improved machine with features not possessed by the old one.

Let's assume that the company has at hand the $5,000 recovered in depreciation allowances on the old machine. The new machine will take $13,000 more. But this $13,000 will have to come out of earnings *after taxes.*

With a Federal income tax rate of 52 per cent, the company will have to earn, before taxes, $27,035 in order to supply the $13,000 of earnings after taxes needed to complete the purchase of the machine. Add to this the $5,000 recovered in depreciation allowances on the old machine, and you have a total of $32,035 involved.

And how much of this total can the company recover in depreciation allowances? Just $18,000—the actual cost of the new machine. And how fast? At the rate of only *$900 a year,* spread over 20 years.

Faced with this kind of arithmetic, the men in charge of a company's financial policies are inclined to hesitate. They say, "Will a new machine really pay out on that basis?" They say "Couldn't we use that money better elsewhere?" They say, "Can't we put this off for another year?" Only too often the result is postponement.

Sooner or later mounting costs show that replacement is absolutely necessary and it is done; but in the meantime, production has been handled on an obsolete machine. Multiply that illustration many thousand times over, and you will begin to get some measure of the extent of the high-cost obsolescence which prevails throughout the American metalworking industry.

The situation can only be remedied by a new tax law. While TD-4422 is in theory merely a regulation, in practice it has the effect of law. It is imperative that the rules covering depreciation allowances should not be left to the arbitrary interpretation of the Internal Revenue Department, but should be specifically laid down by the Congress itself.

In considering the nature of a new law on this subject, it should be

borne in mind that capital spent for new machine tools and similar productive equipment is essentially risk capital. It is a basic principle of the employment of risk capital that it should not be extended beyond a period of the reasonably foreseeable future. An excellent example is the policy that prevents banks from making commercial loans over a period longer than five years.

Capital spent for machine tools is recovered out of the work produced on those machine tools. What will be the volume of this work? What will be its nature? Is any manufacturer warranted in assuming that the volume of the work and the nature of the work will be such, over a period of 20 whole years, as to justify the purchase of that new machine?

Only the manufacturer purchasing a machine tool is in a position to judge the period of capital risk. I propose, therefore, an amendment to the Internal Revenue Code which would provide that after a certain date to be fixed by the Congress, rate of tax-free recovery of such capital should be optional with the individual manufacturer. If he buys a new machine tool, he can write it off in two years, five years, ten years, or twenty, as he chooses.

He can make this decision in the light of the circumstances in his own particular company, viewed from the standpoint of the risk in the reasonably foreseeable future. He alone can estimate in his best judgment what that risk is, and how rapid, in his opinion, should be his rate of capital recovery.

Do not think I am recommending some u n t r i e d or revolutionary scheme. This proposal has repeatedly been made by tax authorities to the Congress. I am suggesting that we in this country apply a principle which has been applied, and still applies, in countries with industrial economies comparable to ours.

Sweden and Switzerland have some of the finest and most modern factories in the world. In those countries, rate of tax-free recovery of capital invested in productive equipment is optional with the individual manufacturer. In fact, he may write off a machine in one year, if he so chooses. The result is that modernization, rather than obsolescence, has been the order of the day.

The Treasury Department has voiced objection to optional or accelerated depreciation upon the ground that it would deprive the government of immediately needed revenue. However, the Treasury Department apparently takes no cognizance of the fact that if a machine is written off in, let us say, two years, the third year the company owning it gets no tax-free depreciation allowance on the machine, and the earnings of the machine become directly applicable to taxable income. It is my contention that under optional depreciation, after the first few years, there would be no loss in revenue to the government—and meanwhile, our country would experience a wave of modernization throughout all industry such as we have witnessed, under the present tax system, only in defense plants in times of emergency.

And how was modernization effected during such periods? Largely by the use of certificates of necessity which permitted five-year amortization. These certificates were based

upon the principle of the period of reasonably foreseeable risk. It was recognized that only on this basis could companies be expected to invest the necessary sums in new equipment and modernization.

This question has a direct bearing upon the military potential of the United States. Our military strength rests basically in our overall productive capacity. In time of emergency, every metal working plant in the country must contribute directly or indirectly to the production effort. We can be just as strong as our plants are productive. Obsolescence is the great, weak link in our chain of national defense.

May I urge, therefore, that companies from every branch of industry make the effort to inform the Congressmen and Senators from their states as to the imperative necessity of writing a fair depreciation schedule provision into the new tax law—and, if possible, send representatives to Washington to present the case from the standpoint of their respective industries before the proper committees of the Senate and the House.

Automatic Controls

ACCORDING to a recent issue of the York Report, the public at large is actually far ahead of many manufacturers in its interest in automatic controls. Today, the output of automatic instruments is largely being absorbed by relatively few industries, notably in steel, chemicals and petroleum, whereas the public shows great interest in a wide variety of automatic devices.

The public is demanding cars with automatic gear shifts, automatic generators, rain-activated convertible tops, air conditioning and other devices employing feedback principles. It wants automatic-cycle washers and dryers, automatic defrosters and ice makers in refrigerators, turret TV tuning, automatic ovens, powered lawnmowers and many other devices to make tomorrow more enjoyable.

It is not entirely the fault of the manufacturers that the public wants automatic instruments in their homes more than manufacturers demand them in their plants. Many manufacturers have not yet been exposed to possibilities of making their plants automatic because specialized engineering talent is being monopolized by defense and atomic energy orders, and present production of instruments is going largely to the few industries in which benefits are greatest and competition dictates maximum use. This accounts for the fact that engineer-salesmen aren't pounding on the doors of thousands of plants in other industries, asking permission to show how installations of automatic instruments can eliminate X number of jobs and increase production efficiency.

The chief purpose of making plants automatic is not the elimination of jobs, but getting more output with less waste. Other advantages include improved quality, less plant space, more safety and lower investment in machines. In the chemical industry and telephone companies, shifts to automatic controls have been followed by rises in both employment and wages.

America is strong and prosperous because of a driving curiosity to seek out new developments and advancements.

—*Dr. Charles F. Kettering.*

A Practical Plan For Replacement And Modernization

By Ralph E. Cross*

A "Projected Profit and Loss Comparison" serves as replacement and modernization planning guide.

AMERICAN business managers and engineers are setting on a veritable powder keg of industrial waste caused by complacency about obsolescence. The situation is more dangerous than generally realized because it leads inevitably to high prices, or low wages, or both. The resulting squeeze on America's standard of living will not be tolerated by the public.

Ralph E. Cross

Americans take their standard of living for granted and they will not relinquish it. On the contrary, their appetites are whetted for even better things. They want more leisure and more goods and mean to get both with less work. If the public becomes convinced that industrial inefficiency is interfering with this goal, or if labor decides that it is responsible for lowering wages, then the clamor for government action will be overwhelming. In other words, if industry does not take steps to maintain and improve its standards of production, then it is inviting government regulation and fostering a trend toward socialism.

Why is inefficient production equipment being used today?

Part of the answer can be found in the complacency of some of our top executives toward industrial waste. Their attitude is well illustrated by a plant I recently visited which machines axle shafts for railroad cars. When I walked in, I could almost sense that something was wrong. And it didn't take long to find out the reason. The men were handicapped in their work because the machines were old—some of them over 50 years old. According to my way of thinking, the men who were making these axle shafts were devoting about two hours a day to actual production. The balance of their time, six hours, was being wasted solely because of

* Executive Vice-President, The Cross Company, Detroit, Michigan.

inefficiently operating equipment.

And, mind you, this is not just an ordinary plant. It is operated by one of the largest companies in the United States. Its management is considered modern and progressive, yet it is using machines over 50 years old. Think of it!

Lamentable as it may be, such industrial waste is much more universal than is generally recognized. Many managements are quite vociferous about modernization in public, but inside the walls of their own establishments they are inclined to let matters ride. Some think it is only for big business, while others think it is only for growing enterprises. There are still others that retain a high degree of enthusiasm for modernization until it comes time to loosen the purse strings. Then enthusiasm wanes, with the result that nobody does anything about it.

These are the natural reactions of management that does not have a practical approach to modernization. Every business needs sound and realistic replacement policies and procedures to assist its management in getting the most of its capital expenditures; no company is too small or too unusual not to have a replacement or modernization program.

For those who are looking into the subject for the first time, the requirements need only be: (1) a statement of policy, and (2) a reliable technique to analyze modernization problems.

Policy, of course, will vary with different companies, depending on requirements. Nevertheless, every company's policy should include at least a statement of the *intent to replace or modernize capital equipment as rapidly as it is economically practical,* and a statement of *intent to review all capital equipment for replacement or modernization at regular intervals.*

The underlying principle of any modernization or replacement analysis is the selection of one method, machine or process that will produce the product without waste. This, in turn, leads to the lowest cost to the consumer consistent with a fair return for labor and the investor. Selecting the best process, as explained in more detail later, is accomplished by comparing the merits of several different proposed methods of operation over a one-year period. The development of a practical procedure can be simple if a few fundamentals are followed at the outset.

No comparison will be complete that does not take into account all factors of the selling price including material, labor, factory expenses, administrative expenses, interest, income taxes and profit. Because of this condition, the procedure must be designed around the company's bookkeeping system, and for this reason, every company will find it desirable to develop its own. One of the simplest procedures is a Projected Profit and Loss Statement. The following example will serve to illustrate:

Method 1 is an old process that has been in operation for many years and is fully depreciated. To meet the production schedule, it must operate on a three shift basis.

Method 2 is a proposed process comprising a minimum number of highly mechanized automatic machines. It requires the least amount

of labor and the highest capital investment. It meets the production schedule working two shifts.

Method 3 is a proposed process involving a number of inexpensive single station machines at a minimum capital investment. It requires more labor, tools, and so on, than Method 2 but less than the older Method 1. To meet production, it must operate on a two shift schedule.

The comparison shows that Method 2 is the best investment. It will earn $69,358 more than Method 1 in the first year of operation, after all expenses. It likewise will earn $10,332 more than Method 3, after all expenses. If the management decides to invest in Method 3 rather than 2, it will lose $10,332 in the first year and in all probability a greater amount in each succeeding year of operation. If it decides to make no investment at all and continues on with the old equipment, it will lose $69,358 in the first year and a greater amount in each succeeding year.

With Method 2 the company has $93,713 available from depreciation plus $130,126 from profit; a total of $223,839 to repay the investment in the first year of operation. Thus, working capital may be restored in as little as 4.8 years. A short payoff period is often looked upon as a very favorable sign of a good investment. This, of course, is a trueism, but at the same time is signifies that someone has been asleep at the switch, and that the time for replacement is long overdue.

On the other hand, a long payoff period indicates an alert management that is investing wisely to reduce losses resulting from obsolescense and old age. The payoff period is a useful device to determine the point at which working capital may be restored, or a loan repaid, but it should *never* be used to determine the most opportune time for replacement.

The right time for replacement is any time that new equipment will earn more profit than old equipment after all *expenses and charges, regardless of the length of the payoff period.*

The estimate for depreciation requires extra careful consideration inasmuch as it must recover the investment within the estimated life of the process and, at the same time, it must satisfy the requirements of the Bureau of Internal Revenue. The first step is to make an estimate of the expected life of the process. This should give consideration to two factors; market potential and the probability of obsolescence. It should not in any way be foreshortened by a desire for a fast recovery of capital. Such a consideration will not only distort the final result but most certainly will be rejected by tax authorities. The next step is to make an estimate of the salvage value of the equipment at the end of the useful life of the process. These two figures will provide the basis for computing the depreciation allowance. The example will serve to illustrate. The estimated life of the process is eight years and the estimating salvage value of the equipment is 30 per cent after eight years of operation. The depreciation allowance, therefore, is ⅛ of 70 per cent of the cost of the equipment. If it is felt that the depreciation allowance, arrived at in this manner, will not be acceptable

PROJECTED PROFIT AND LOSS STATEMENT FOR THREE METHODS OF PRODUCING OIL PUMP BODIES

Production—1,250,000 pieces per year
Estimated life of process—8 years

	METHOD 1	METHOD 2	METHOD 3
INVESTMENT REQUIRED	None	$1,071,000	$ 850,000
Sales			
1,250,000 Bodies at 0.82 each	$1,025,000	1,025,000	1,025,000
Cost of Sales			
Material	396,000	396,000	396,000
Subcontracting	None	None	None
Direct Labor	187,268	53,328	79,592
Rework	1,500	495	825
Setup and Tool Change	7,434	3,638	5,139
Supervision	20,250	7,000	7,000
Labor Fringes	43,290	12,892	18,511
Floor Space	4,435	5,443	4,760
Power	3,475	6,000	5,100
Taxes	5,000	21,420	17,000
Insurance	1,791	3,750	2,975
Perishable Tools	27,050	18,750	20,100
Supplies	9,200	3,720	3,820
Scrap	26,060	13,480	18,300
Tool Grinding	13,320	7,750	9,630
Machine Repair	15,500	5,100	3,750
Lubrication	3,550	1,250	2,500
Depreciation	None	93,713	74,375
Miscellaneous	28,090	7,999	11,938
	793,213	661,728	681,315
Gross Profit	231,787	363,270	343,685
Selling Expense	66,625	66,625	66,625
Administrative Expense	43,627	36,395	37,472
Interest	None	None	None
Profit Before Tax	121,535	260,252	239,588
Estimate for Federal Income Tax	60,767	130,126	119,794
Net Profit	60,768	130,126	119,794

to the Bureau of Internal Revenue, then the net profit should be reduced by an amount that will make up the difference.

One of the significant points about the comparison is that every factor of Selling Price is used that appears in the company's Profit and Loss Statement. The elimination of any factor because it might be difficult to estimate, or for other reasons, will only lead to false conclusions. For example, if perishable tools are eliminated, Method 2 will pretend to save $64,980 over Method 1 instead of $69,358, or if Federal Income Tax

is eliminated, the difference will be $138,717 instead of $69,358. Likewise, the addition of safety factors which are not a part of the Profit and Loss Statement will be misleading.

In developing the procedure, the breakdown of accounts should parallel the company's accounting system. Thus, in many cases, historical data can be obtained from the company's bookkeeping records in order to rapidly verify the estimates.

Analyzing modernization and replacement plans with a Projected Profit and Loss Comparison provides a means of getting all of the facts. Management can quickly appraise the effect of changes in labor rates, taxes, interest rates, or other factors, up or down;—it can prescribe reasonable limits for probable changes;—it can place a quantitative value upon the saving of one method over another;—it can measure the benefits of progress;—it can even measure the cost of delaying modernization;—and it can be assured of getting the most out of its capital expenditures.

Forging Ahead

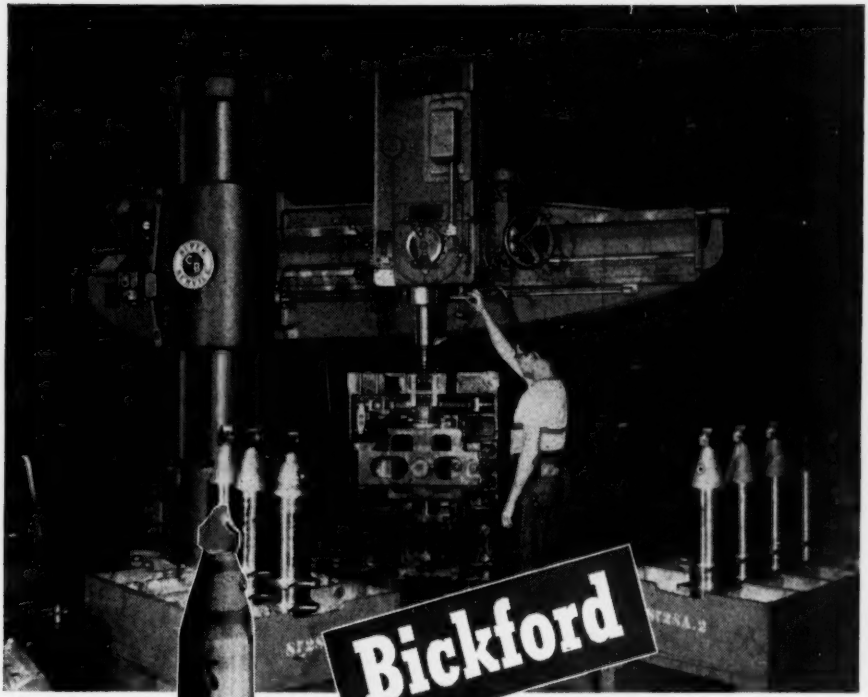
INDUSTRY expenditures for new capital equipment in 1953 may well reach a record amount according to a recent report published by the Council for Technological Advancement. The Council points out that present anticipated capital expenditures generally reflect a strengthening of investment intentions as compared with predictions reported earlier this year and in the latter part of 1952.

It is noted that a joint Commerce Department-SEC survey of current anticipated capital expenditures points to expenditures of $27.0 billion in 1953 for non-farm plant and equipment, an increase of $500 million over 1952 and $6.4 billion over 1950. In discussing estimates for capital expenditures during the second half of 1953, the Council suggests that if business remains fairly constant through the first six months of 1953, it is unlikely the year end will see a drop in capital goods spending.

As defense expenditures hit a peak, the years immediately beyond 1953 are likely to see a larger proportion of capital expenditures go into modernization and replacement as contrasted with the recent emphasis on expansion, the report states. Therefore, if equipment producers are to maintain an aggregate volume of sales comparable to that experienced since the war, a more rapid rotation of the nation's capital equipment will be necessary. The report points up the underlying importance of depreciation accruals in capital equipment procurement policies.

Inadequate depreciation accruals resulting from Treasury insistence on straight-line write-offs over extended service lives, currently place a serious drag on modernization and replacement planning and needlessly reduce the amount of funds available to business for investment in the period ahead.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.



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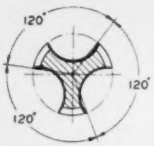

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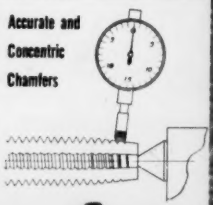

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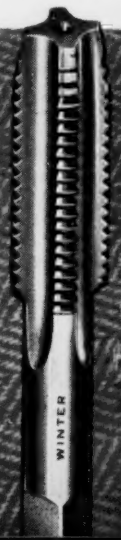

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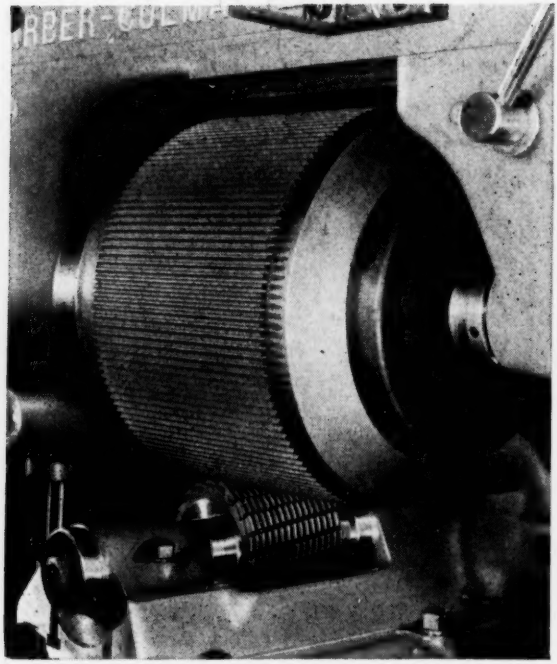


Barber-Colman HOBBING BOOSTS RING GEAR PRODUCTION!

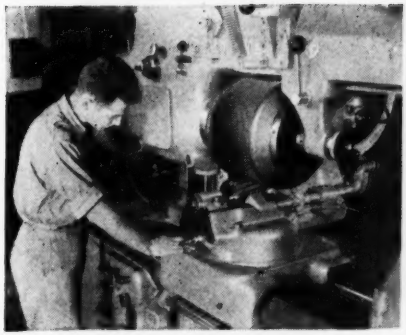
1 Gear Every 1-1/2 Minutes

This Barber-Colman No. 14-15 Hobbing Job is typical of how Engineered Hobbing pays off on gear production problems. These flywheel ring gears are nearly 15″ in diameter, with 146 teeth and .375″ face width. They are hobbed 24 per load at the rate of 36 minutes floor-to-floor, or 1-1/2 minutes per gear. Blanks are formed by rolling flat stock into a ring and butt-welding. The rings are then mounted on specially-designed work arbors and hobbed at .100″ feed per revolution and 75 hob rpm.

BUILDERS OF PRECISION GEAR

2300 Gears Per Hob Life

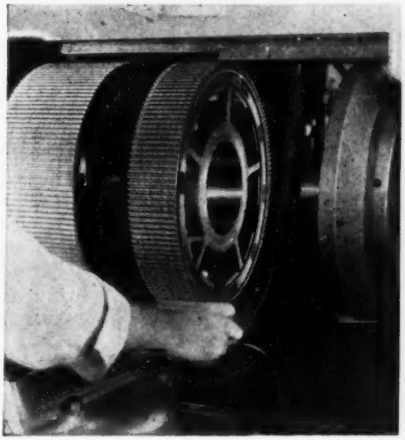
On this job 2300 gears are cut per hob — about 195 pieces per sharpening. Low-cost unground Multithread hobs are used. Multithread design, with its increased indexing speed, has reduced total time to 1-1/2 minutes per gear. Fast loading and automatic hobbing cycle reduce operating costs to a minimum.



ENGINEERED HOBBING PAYS OFF!

Tooling Suits Specific Problems

Barber-Colman Engineers designed special mandrels to hold 8 of these large diameter blanks per load. The mandrels are mounted three on the arbor (24 blanks) for each cutting cycle. Blanks are pressed onto the mandrel prior to hobbing, thus reducing loading time between cycles. A special loading fixture aids the operator in lifting and positioning the mandrels on the arbor.



Fast, accurate gear hobbing — with tool costs far below comparable methods — gives you the best possible approach to high-production gear output. Rigidity of the Barber-Colman No. 14-15 Hobbing Machine allows the use of high feed rates and the fast indexing which is inherent with Multithread hobs. Special tooling eliminates job kinks and difficulties. Let Engineered Hobbing work for you, too. Call your Barber-Colman representative and ask him for recommendations on your gear cutting operations.

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HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 850 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

HOBS AND MACHINES SINCE 1911

Take a closer look at the

MACHINABILITY

You'll like it

You'll find the machining characteristics of B&W Mechanical Tubing make it adaptable for turning out hollow cylindrical parts with any type of machine tool on mass production or jobbing basis. You can get this versatile tubing in grades, tempers, finishes and sizes to suit any combination of production conditions and product specifications. And no matter what analyses you need—carbon, alloy or stainless steels—to get the desired physical properties in your finished machined parts, B&W can supply them.

You'll find Mr. Tubes—your nearby B&W Tube Representative—a good man to consult when you need help in determining the best available mechanical tubing for your specific requirements.

B&W SEAMLESS and WELDED TUBES

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

TA-1751(M)

MODERN Machine Shop 25th YEAR 1928 1953 SERVING THE METAL WORKING INDUSTRIES

Anniversary Feature

ON the following pages are typical examples of modern manufacturing techniques that have enabled the companies who have adopted them to increase their production.

Convair Sets Pace with Modern Tools and Methods

By A. E. HILL*

Newest production aids include mobile stock carts and Cincinnati Bickford drilling machine equipped with Bullard Man-Au-Trol table.

IN the production of modern aircraft—and notably in the production of military airplanes—the constant objective is to increase range and speed. To satisfy this objective, engineering changes must be made constantly, with resultant production problems.

In anticipation of engineering changes, production lot sizes of certain manufactured items must be kept to a minimum. Obviously, to fabricate precision jigs and fixtures for the production of minimum-sized lots, and to revise them continually to meet changes, can

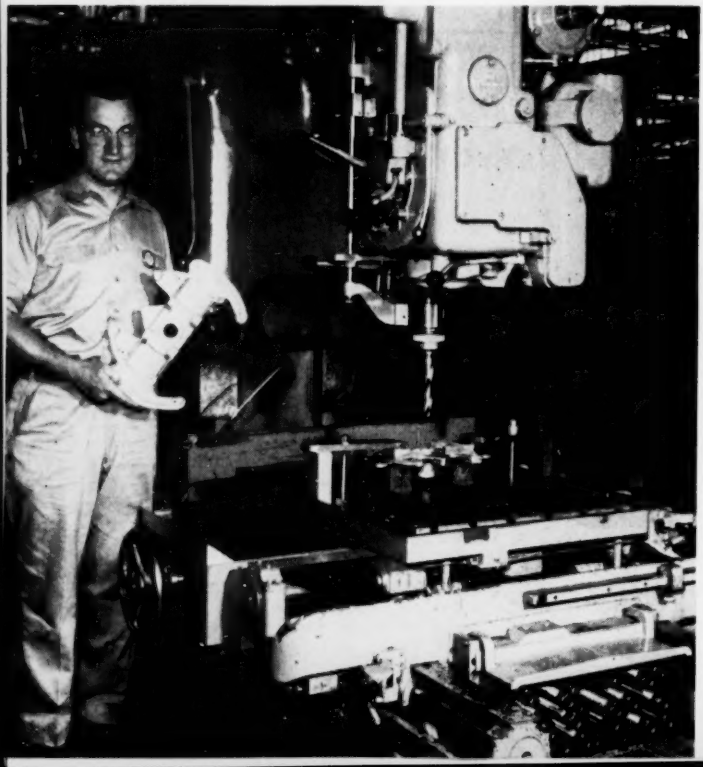


Fig. 1—Flexibility is derived from the combination of the precision drill press with the Man-Au-Trol table accessory. Stop adjustments for the 20 longitudinal positionings may be observed located below the table at the right.

* Chief, Manufacturing Engineering, San Diego Division, Consolidated Vultee Aircraft Corporation.

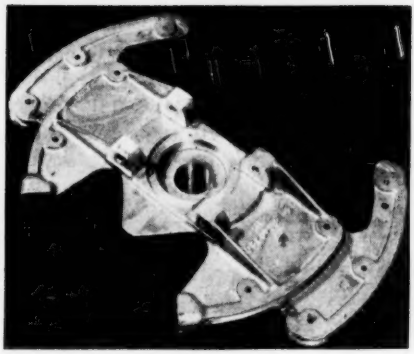


Fig. 2—A good example of the type of work which can be handled on the Cincinnati Bickford drilling unit at Convair is this rudder quadrant for a Model 340 Convair-Liner. This part has a total of 15 holes on the top surface. Ten are drilled, four are drilled and tapped, and one is drilled, counterbored and reamed.

prove very expensive, if not prohibitive.

Accordingly, Convair-San Diego has attempted wherever possible to solve the problem of minimum-lot production through use of modern equipment capable of handling such assignments. In this connection, we recently purchased a Cincinnati Bickford precision drilling machine equipped with a Bullard Man-Au-Trol table.

This machine, one of many different types of modern production equipment now installed in the Convair-San Diego plant, is especially suited to multiple drilling, reaming, and tapping operations. Its flexibility derives from the combination of the precision drill press with the Man-Au-Trol table accessory. See Fig. 1. It should be noted that the table is an integral part of this particular model of the Cincinnati Bickford drill, and cannot be removed to permit use of the drill alone, nor attached to other drills.

Fig. 3—A typical setup, with rudder quadrant casting in position for drilling. Note handy location of all operating levers. The stop adjustments for the 13 transverse and 20 longitudinal positionings may be observed located below the table at the left and right.

This machine is capable of precision work on production lot runs without requiring the expensive jigs or fixtures generally used on production machines. We have found this Cincinnati Bickford able to accomplish such runs with standard set-ups, such as parallels, clamping devices, Vee blocks, and so forth. A minimum of set-up time is involved. Workpieces such as shown in Fig. 2 may be attached to the table and accurately positioned for a number of drilling operations in predetermined locations. Any combination of drilling, reaming, or tapping operations can be accomplished.

The Man-Au-Trol table, measuring 32 in. x 40 in., may be moved transversely in either direction 20 in., and longitudinally in either direction 30 inches. Hydraulic transverse positioning to any of 13 alphabetically-lettered positions is possible; similarly, longitudinal movement is possible to any of 20 numbered positions. Once the transverse and longitudinal stops (lower right and left corners of Figure 3) have been accurately adjusted and set to the piece being machined, each succeeding part can be moved almost instantly to any desired position.

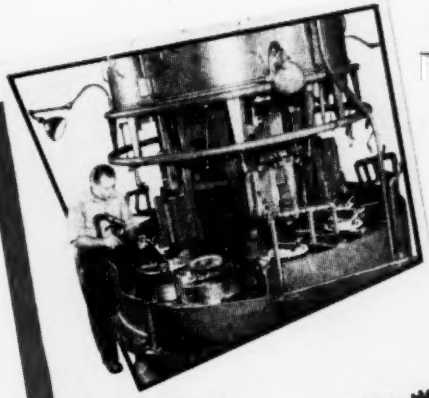
Fig. 4—View of employees loading mobile stock cart from central stock crib.

The Man-Au-Trol spacer is equipped with an extremely accurate set of length gauges and an adjustable micrometer to facilitate the original adjustment of stops. After setting stops, each can be locked, preventing any possible movement. The accuracy of repositioning (note hand wheel position selectors at front and

. . . a customer speaks with

CONFIDENCE

in his manufacturing equipment



Quantity Production . . .

• Quantity production of identical gears offers a challenge that we here at BRAD FOOTE are eager to accept.

• Multiple spindle machines, duplicate machines, numerous and varied machines, every machine that's needed—PLUS men of long experience making close tolerance gears . . . these factors make it possible for us to confidently accept such a challenge.

• When you specify BRAD FOOTE gears, you do so with the knowledge that each gear will be made to exact specifications; that every gear of a quantity will be identical in structure, in size, and in appearance; that each operation on every gear will be performed by BRAD FOOTE people in BRAD FOOTE shops. No one will share our responsibility.

• You will be satisfied with the BRAD FOOTE gears you buy because they will give long, economical service on the equipment you operate, or on the machines you sell to our . . .

• Your inquiries are invited.

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Mult-Au-Matics

have earned this confidence in many plants.

Mult-Au-Matic accuracy and efficient production are key notes from satisfied users.

Where others profit from Mult-Au-Matic installations, you too can benefit. Ask Bullard for surveys on your work.

THE BULLARD COMPANY

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Fig. 5—Mobile stock carts are moved into position near aircraft along primary assembly line thus eliminating time lost by personnel traveling between work stations and central stock crib.

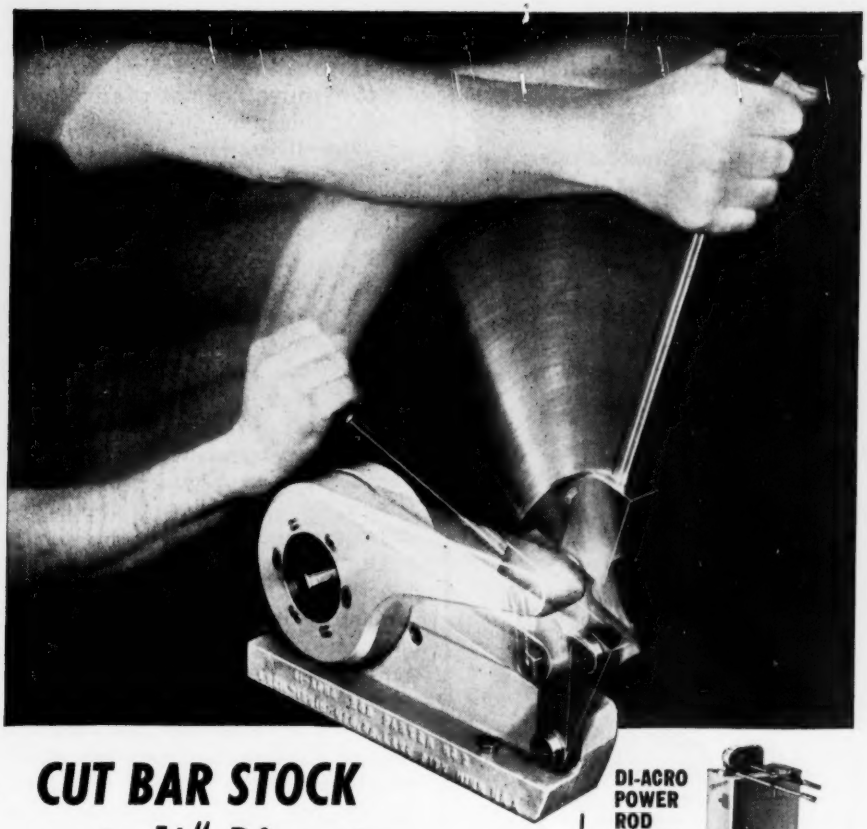
left front side of saddle—Figure 1) to these stops is plus or minus .0005 inch.

The depth of drilling or reaming is easily and quickly set on the Cincinnati Bickford precision drill by means of a compensating dial depth gauge. Note ring dial outside of the two feed levers in Figure 1. Power feed engagement operates with finger tip ease, and disengagement is automatic or by hand at any time.

The extreme simplicity of operation permits the use of semi-skilled operators even on precision work. Operation fatigue is reduced to a minimum due to the automatic positive positioning of work. Better visibility of work at all times facilitates inspection and chip removal difficulties.

A good example of the type work that this combination machine can handle is the casting shown in Fig. 2. This part has a total of 15 holes on the top surface. Ten are drilled holes, four are drilled and tapped holes, one is drilled, counterbored and reamed. Very close tolerances of this part are held with ease with this versatile machine.

Convair has found this equipment very useful and economically practical. While actual dollar savings



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ACCURATELY, INSTANTLY WITH DI-ACRO* ROD PARTER

The shearing-breaking action of a Di-Acro Rod Parter allows most bar stock to be cut without burr and distortion. Cutting heads accommodate eleven different round stock sizes. Also special heads for cutting square, and other shaped bars.

DI-ACRO POWER ROD PARTER

Instantaneous cutting action. Motor driven flywheel and other moving parts are housed in welded steel cabinet.

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Gives complete details on hand and power operated Di-Acro Rod Parters, Benders, Brakes, Notchers, Punch Presses, Rollers and Shears.

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Creators of "Die-less Duplicating"

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BALANCING MACHINES

FAST...and ACCURATE!

- FANS
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- BRAKE DRUMS
- SHEAVES
- PULLEYS
- MANY OTHER APPLICATIONS

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PRECISION DRILLING MACHINES

TAYLOR DYNAMOMETER AND MACHINE COMPANY
528 W. Highland Ave.
Dept. S7, Milwaukee, Wis.

effected are not available at this time, our experience indicates beyond doubt that, for small lot runs where fixtures are not available or feasible, this machine can contribute substantially to the reduction of machining costs.

Instead of serving employees through an issue window, central stock crib personnel at Convair now fill mobile carts, as shown in Fig. 4, and roll them to work stations on the Convair-Liner primary assembly line shown in Fig. 5. There, employees may help themselves to parts as needed. Each cart-load, or "kit" of parts, contains the exact number of items required at a given station for a given period in the production schedule.

Under the earlier central-crib system of parts issuance on the primary assembly line, an employee would have traveled a considerable distance from his work station to the crib to secure a part. There he might have incurred further lost time by having to stand in line while other employees were served. The new system has effected important savings in production time.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.

ONE OF A NUMBER of different tumbling barrels in which sample parts are processed in the new Norton barrel-finishing department.

Get the

"TOUCH OF GOLD"

Sample tumbling FREE in the new Norton test department

Can you "tumble" with the "Touch of Gold"? Can you be sure that you are adding value to your product each time the barrel turns in the barrel-finishing operation? Have you investigated this method as a way to more efficient processing and higher profit?

You can get samples processed without cost — in the newly enlarged Norton sample processing department with tumbling barrels of different types and capacities, plus auxiliary equipment such as a mechanically vibrated screen. Here Norton engineers, long experienced in tumbling procedures, determine for you just what barrel-finishing can do for the metal parts you send.

The range is wide. We have been successful in finishing parts ranging from tiny needles to castings and forgings weighing several pounds. Many manufacturers already have the "Touch of Gold" with substantial savings and production speed-up.

Tests result in detailed recommendations on barrel type, size, speed and amount of ALUNDUM* Tumbling Abrasive, amount of water, type and amount of compound or cleaner, time cycles and other data.

No obligation — send now. Mail us your representative sample parts plus (a) finished sample to be matched and (b) information on your present barrel-finishing equipment, if any, including type, size and speed of barrel. Send to NORTON COMPANY, Worcester 6, Mass., attention Sales Engineering Dept., Abrasive Division. Tests take about a week.

Also available is a 55-page Norton handbook on barrel-finishing. Ask your Norton Distributor for Form 501 or write us direct.

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ABRASIVES
Making better products to make other products better

Modern Equipment and Methods Featured in Studebaker Operations

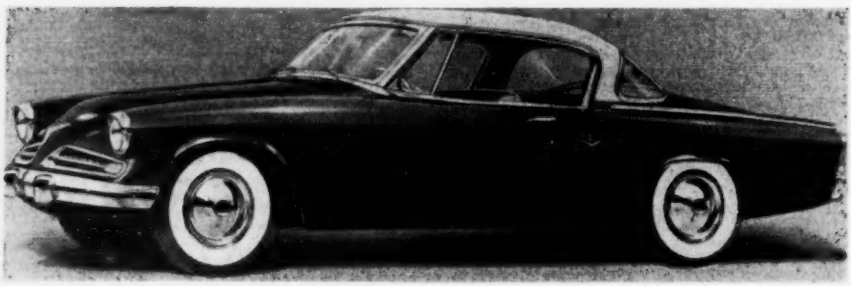
"Style Leader" in motor cars maintains constant vigil for improved manufacturing techniques.

MODERN equipment and methods required in the production of 1953 Studebakers in the South Bend, Indiana, plant includes one of the largest automobile body conveyors in the industry, an electro-static process combined with automatic spray booths to apply the prime coat to car bodies, and a vacuum delivery system for handling cast iron and steel chips from the machine shop.

Completed at a cost of $625,000, the enclosed body conveyor is 5,310 feet long. It is designed to transport fabricated bodies and hardware trim from manufacturing areas to the final assembly line, and on the return trip to carry fender and small components from a supply building to the body plant. A section of the conveyor is shown in Fig. 1.

Finished bodies are carried over or through seven buildings from the extreme north edge of the manufacturing area to final assembly at the extreme south edge. This is a one-way distance of 2,055 feet. A longer distance is required on the return trip in order that parts destined for the body plant may be picked up.

The conveyor enclosure is 17 feet wide and 10 feet high. It is constructed of galvanized metal decking over steel framework, and a walk-



Low, sweeping contours of European styling are distinguishing features of the 1953 Studebaker Commander hardtop—lowest in height of any standard American-built automobile.

Fig. 1—Section of the mile-long Studebaker body conveyor showing how the new system passes over and through existing buildings. The conveyor serves as the "float" for finished bodies, and delivers small parts and trim on the return trip.

way inside provides access for maintenance and repair. It is heated at all points where the conveyor enters or leaves a building. Addition of the conveyor system adds greatly to the efficiency of manufacturing operations, and provides for an even flow of materials formerly moved by truck.

Changes in materials handling also result in a better quality of product. Rear fenders now are attached before bodies leave the body shop instead of on the final assembly line as was the practice formerly. The body and fenders are painted as a unit instead of in component parts.

The conveyor itself serves as storage space, or float, for bodies while they are in transit to final assembly. Storage adjacent to the final assembly line, where finished bodies formerly were stored on end until needed, has been released for storage of other assembly items such as hardware trim and small components. Some assembly work, formerly done in the body plant or on final assembly, now is done along the conveyor line.

Traffic congestion in the vicinity of the manufacturing area is relieved by diverting materials handling off the street level. Finished bodies

formerly were transported from the body plant to final assembly by means of specially equipped truck trailers. It was necessary for these trucks to cross a busy thoroughfare that bisects the plant. The new conveyor now crosses this thoroughfare at the third floor level.

used for a two-coat application in a given period of production, according to paint engineers, but all of the paint gets to the body shell without waste. Also, the spots that are difficult to reach by manual spraying are sure to catch as much prime coating as any other part of the body.

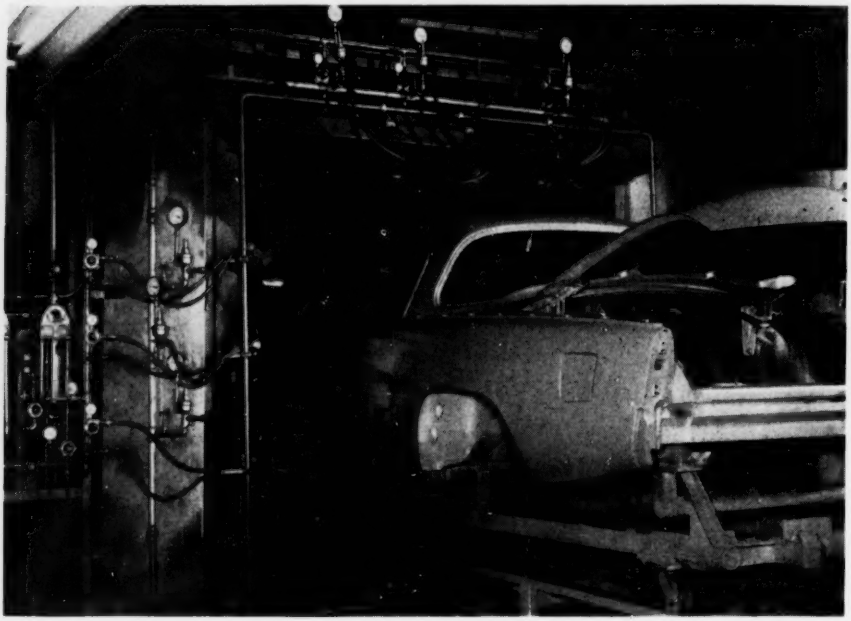


Fig. 2—Studebaker body entering second of two tandem automatic electrostatic spray booths for application of prime coating. Nine spray nozzles are adjusted for direction and pressure, while magnetic field is set up by wires visible inside booth.

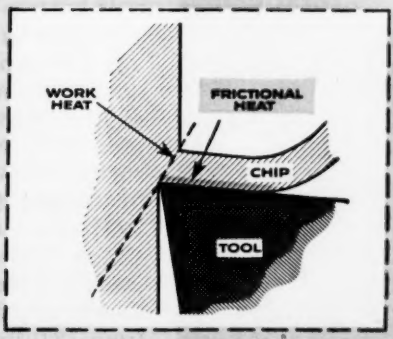
The adoption of Electro-static painting of the prime coat on Studebaker bodies is another excellent example of a method designed to save time and material. The system was developed by Studebaker engineers to combine the electrostatic feature with automatic spray booths.

There is no appreciable difference in the gallonage of priming paint

Trip levers on the floor chain conveyor start spray guns into action as soon as a body enters the magnetic field. Guns are located at both the entrance, as shown in Fig. 2, and exit of two similar in-line booths, and are adjusted for proper direction. All guns shut off automatically if the conveyor stops, and start again when the conveyor starts.

JOHNSON'S WAX-COOL ATTACKS FRICTIONAL HEAT

New water-soluble coolant effectively lubricates at tool-chip interface.



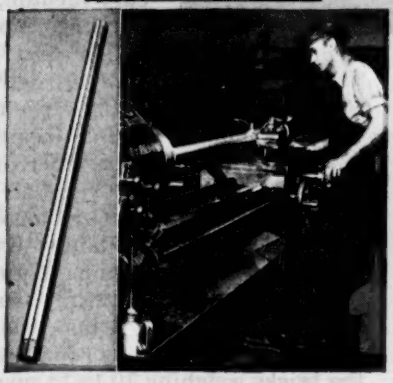
1. WAX-COOL stays with tools and material even at temperatures up to 450°F. and pressures to 200,000 P.S.I.

2. WAX-COOL prevents chip weld because work runs cooler.

3. WAX-COOL effectively minimizes frictional heat which is by far the principal source of heat.

Because of the greater lubricity of certain waxes and their high polar attraction for metal, Wax-Cool is the first coolant to greatly reduce frictional heat at the tool-chip interface. Wax-Cool also has the heat carry-off properties of ordinary coolants – to check work heat generated in the shearing zone.

HERE IS PROOF!

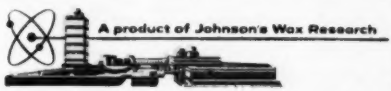


Wax-Cool is being used effectively on this tough job at the E. J. Longyear Company, Minneapolis. They are turning down the external surface of a 4'6" length of #2320 steel tubing. One rough and one finish cut. On a 15-piece run it took 3 days with 4 pieces of scrap, and a poor finish. With Wax-Cool the job was done in 2 days with no scrap and a mirror finish. They used to cut half-way and reverse the tube in the lathe. Now they cut its full length for a straight, accurate cut. Call your Johnson distributor for an on-the-job test, or write:

Industrial Products Dept. MMS-9
S. C. Johnson & Son, Inc., Racine, Wisconsin

Ask about Wax-Cut—wax-type cutting *oil* for automatic screw machines, gear cutting machines, etc.

Ask about Wax-Draw—wax lubricant for drawing and forming all types of metals.



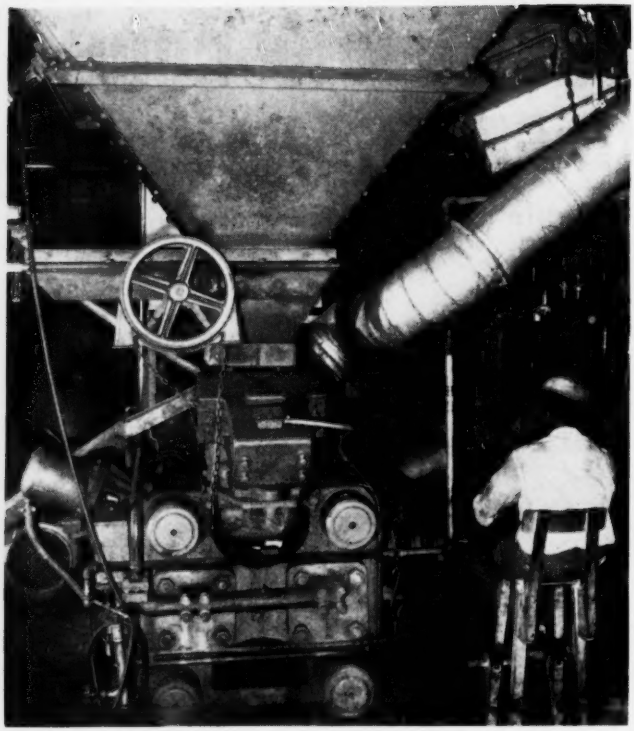


Fig. 3 — Briquetting machine is the last step in Studebaker's vacuum system for handling chips from the machine shop. Machine is fed from overhead hopper, and briquettes are delivered to railroad car through enclosed elevator at right.

Pickup tubes are dropped down from a main delivery pipe at convenient locations throughout the machine shop. Chips are drawn into the main delivery pipe at from 12.0 to 5.5 inches of mercury vacuum, depending upon which feed station is being served, and are delivered to the briquetting machine, shown in Fig. 3, which is located a distance of 900 feet at the rear of the machining area.

Two attendants are required to operate the booths chiefly to clean and adjust nozzles periodically when the line stops. Control switches are located at four convenient locations between the two booths. Air currents within the booths are critically controlled to prevent paint from being drawn away from the magnetic field. Voltage of 95,000 to 98,000 is required in each booth.

Another Studebaker improvement is vacuum tube collection of cast iron and steel chips from the machine shop. This system eliminates long-distance handling, and keeps machine areas relatively free of chips at all times.

Dry cast iron chips are stored in an inverted pyramidal hopper above the briquetting machine. Care is taken to exclude wet or oily material. Graphite is added just prior to briquetting. After being compressed, the bricks weighing 10 to 11 pounds each are delivered by apron conveyor direct to a railroad gondola car outside the building. Delivery pipes are seamless tubing varying from 5 inches to 8 inches in diameter.

The pneumatic system has a ca-

pacity for approximately 192,000 pounds of cast iron chips in an eight-hour shift, but the briquetting machine will handle only 56,000 pounds in an equal time. Consequently, it is necessary to operate the briquetting machine on a two-shift basis even though the pneumatic system is not used to capacity.

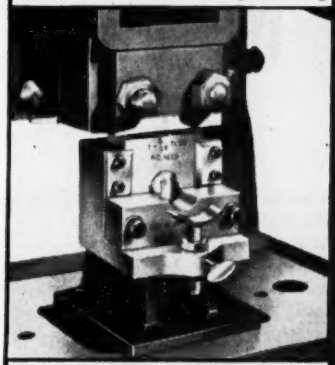
History of Strength of Materials. By Stephen P. Timoshenko. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 452 pages. Illustrated. Cloth binding, board covers. Price, $10.00.

This book presents the history of the development of the science of strength of materials from its beginning to the present. Because there is an inextricable interrelation between the sciences of theory of elasticity and theory of structures with that of strength of materials, the author includes those portions of their histories which have a close connection with and bearing upon the major subject. Handled chronologically, the text treats the developments of the sciences by periods of history. Within these periods, major contributions made by prominent scientists and engineers are related in brief biographies in order to provide a complete, picture of developments.

Coming up to the present, there are discussions which bring together the progress of strength of materials with the state of engineering education and with development of industries in various countries. These considerations include the modern effects of railroad transportation, the use of steel as a major structural material, and the development of combustion engines and light airplane structures.

Notch 12 PIPE ENDS per MINUTE

Make Perfect Joints for Welding or Brazing



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NOTCHES CLEAN
NO FINISHING
NO DEFORMATION

Standard ARC-FIT in hand or power press shears contours for "T" joints for ½" to 2" pipe or tubing with easily interchanged dies.

Special ARC-FITS for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock.

Standard Arc-Fit works well in our special HAND PRESS

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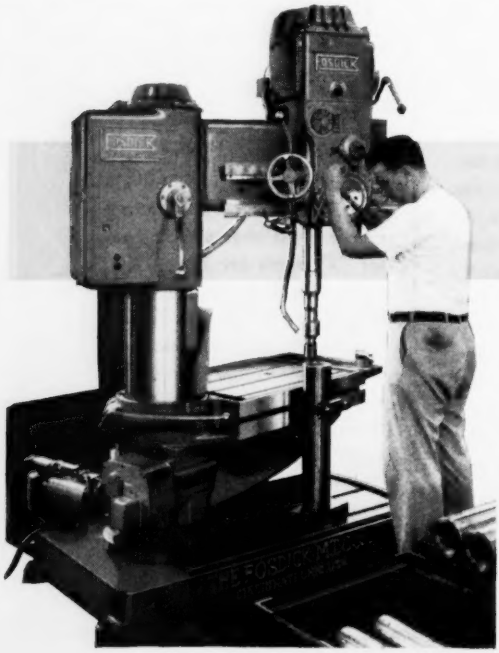
Here's another reason it pays to get a proposal from Fosdick

We put a table on the

When Fosdick engineers put a table on the radial, a unique and basic machine tool was born. This machine combines the best features of two proven, reliable designs. It gives you the capacity and flexibility of a radial—the rigidity, compactness and convenience of an upright. It's the machine you need when you want versatility and economy in limited floor space.

The arm of the Sensitive Radial swings 360° on the rigid one-piece column. Controls are always at the same convenient height. Work is placed on the adjustable table, *or* on the base with the table swung out of the way. Drills up to 1½". 12" column, 3' or 4' arm, nine speeds, four feeds, 3 hp motor, reversing motor control for tapping.

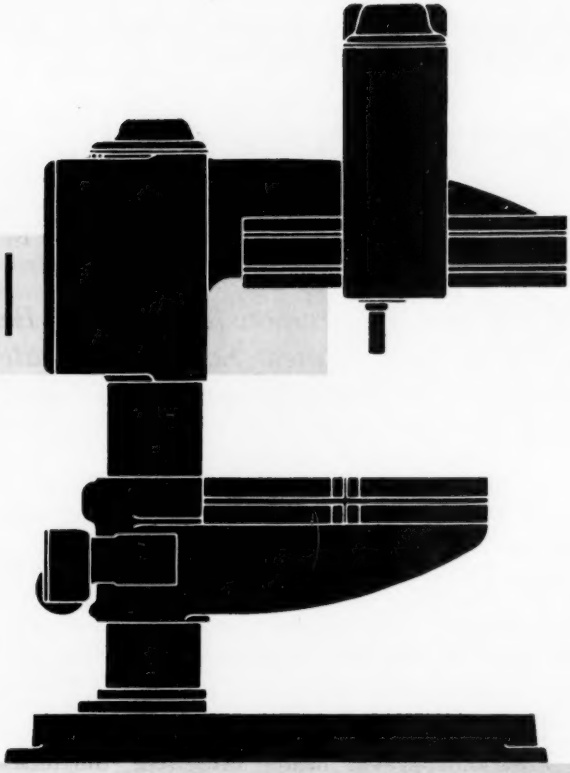
For full information on the Sensitive Radial, ask for Bulletin SRMS



to give you

Variety problem solved at Lodge & Shipley

Building 46 lathe models from 14" to 60" requires plenty of production versatility. To drill and tap a broad variety of vari-shaped parts, *Fosdick's proposal* recommended the Sensitive Radial. Now Lodge & Shipley assigns tool blocks, levers, cam plates, spindles and many more complex parts to their Fosdick, knowing it will produce fast and easily. *Operation illustrated:* Tailstock spindle clamped to table vee. Drill, chamfer and tap 4 holes. 17/64" drill, 1020 rpm, .004 ipr, 7/8" deep. Chamfer, 1020 rpm. Tap 5/16" x 18 thread using Automatic Tapping Control (extra equipment), 240 rpm, 1/2" deep.



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Chrysler Achieves High Production Rate with Automatic Welding

By Herbert Chase

Special fixtures promote fast loading. Beads are laid down as work rotates. Screens separate fused from unfused flux, later being recovered and elevated by conveyors for reuse.

CHRYSLER Corporation, Detroit, recently has installed new lines for fabricating parts and assembling them into the new torque converters now available on Chrysler and Plymouth cars. Much of the assembly work is done by automatic submerged arc welding performed on specially built Expert machines equipped with Lincolnweld heads and with automatic setups for recovery and reuse of unfused granular flux.

Welding is done rapidly and uniformly and some machines have duplicate fixtures so arranged that one can be unloaded and reloaded while welding proceeds in the second fixture. This, of course, permits maximum output per machine and per operator. Besides loading and unloading fixtures, all the operator need do, as a rule, is to swing the fixture into welding position and press a button that starts the automatic welding cycle, at the end of which the weldment and fixture are ready to be indexed into unloading position as the other fixture, loaded during the cycle just completed, shifts into welding position.

Front and rear halves of the outer case (the rear half containing an impeller assembly) are joined initially by hand tack welding merely to hold them in correct relative position. To make the continuous circumferential arc weld, the tack welded unit is clamped in the machine, Figure 1, being set against a faceplate that is inclined about 15 degrees to the vertical. Location is over studs on this plate, and locking is done by means of a gate having a capstan screw to clamp the work tightly against the plate, as shown in Figure 2.

This brings the seam directly below the vertical ⅛ inch electrode wire of the automatic head. When its start button is pressed, No. 760 flux starts to flow and the mild steel wire feeds down, strikes the arc, and the weld starts. At this instant, the work begins to rotate slowly. Flux keeps the arc submerged, and unfused flux drops off as rotation con-

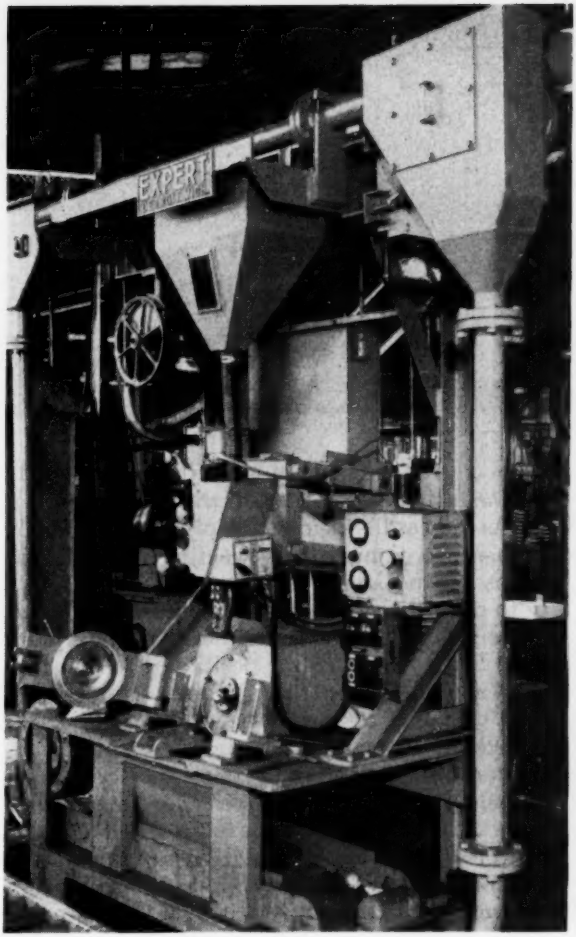

Fig. 1—Expert machine employed to join two halves of the outer case for a Chrysler torque converter by automatic arc welding. The fixture is shown with its gate open ready for loading.

tinues, falling onto a screen that separates the unfused granular flux from particles of fused flux that drop off. Unfused material passing the screen is elevated by means of a conveyor to a large hopper at the top of the machine. From this hopper the flux feeds by gravity into a smaller hopper that is a part of the welding head and is reused.

It requires about 60 seconds per piece to complete the welding cycle, including loading and unloading; hence, about 60 pieces an hour are welded per machine. One handles Plymouth and one Chrysler components, these being processed along separate lines. Addition of two more duplicate machines on each line is contemplated when production demands require this.

In another setup a similar machine, Figure 3, flanged impeller hubs are welded to impeller shells. In this case, two fixtures, shown unloaded in Figure 3, are mounted on an inclined table that is indexed 180 degrees between welds. This arrangement makes it possible to unload and reload the fixture at the front of the machine while that previously indexed under the welding head is in welding position.

Hubs fit the central pivot of the fixture and the shell is centered on a step diameter of the flange. This diameter is a press fit in the shell. After these components are placed

Fig. 2 — Close-up showing a submerged arc weld being made as the previously tack welded assembly, clamped by the gate capstan screw, is rotated by the fixture under the automatic Lincolnweld bead. Unfused flux is collected and reused.

in the fixture, the operator of the machine fastens the shell with three lugs. As soon as the weld on the prior weldment is completed, the welding head is rocked upward automatically to clear the work, and the table is then indexed to bring the newly loaded fixture into welding position.

Thereupon, the operator presses a start button. This causes the welding head to be rocked down. Flux flow starts immediately and as soon as electrode wire feeds down and strikes the arc, rotation of the fixture and work starts, and the weld bead is laid down automatically around the flange step diameter. As the weld is at a point where there is little clearance, practically zero overlap is allowed. This avoids any machining of the weld such as might be required if overlap were permitted. While welding proceeds, the operator unloads and reloads the fixture in which the prior weld was made, this fixture being in the lower or front position.

Although the arc is submerged in flux, some of the heat it generates is conducted and some is radiated to the hub which has been heat-treated previously. As the hub temperature developed in welding was sufficient to affect the hub hardness, a fibre ring having a hole that fits the hub is placed over the hub before it is indexed to welding position. This shields the hub and reduces its maximum temperature attained enough to keep hub hardness within specified limits.

In the Expert hub welding machines, of which four like that described are in use, about 80 weldments an hour per machine are turned out, but it is expected that the rate may be increased to 120 an hour per machine with further experience. Total output of these weldments is augmented temporarily by that of an improvised machine using an automatic Lincoln head to weld identical parts. These welds are of the same quality as on the Expert machines, but the improvised machine is slower and less convenient so will be displaced by the type described when added machines become available.

As Figures 3 and 4 indicate, the inclined fixture table is above a hopper into which unfused flux falls. At

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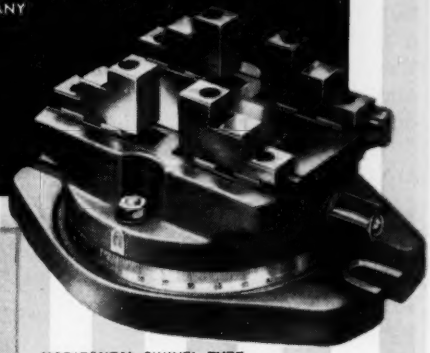

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the base of the hopper, screening is done and the screened flux is elevated by a conveyor and reused just as in the machine shown in Figures 1 and 2. In the machine shown in Figures 3 and 4, rotation of the fixtures during welding is effected by a rubber tired friction drive wheel that is not affected by the somewhat abrasive flux should any find its way onto drive surfaces.

Wire and flux used in the machine are the same as in that first described. In both, the electrode feeds from a reel near the floor where the coil is easy to load. From the reel, the wire passes over a pulley and then downward through the wire feed of the head.

Machines nearly identical to those in Figures 3 and 4 are employed to weld drawn cups to the front plates of converters, the plates also being drawn steel stampings. At the open end of the cup there is a turned step diameter that makes a press fit in the cover hole. Where the two parts meet, the respective walls are at right angles and are joined by a fillet type automatic arc weld that is of smaller diameter than the weld made on the hub. (Figure 4).

For cup-and-plate welding there is a pair of fixtures mounted on an inclined table that indexes 180 degrees between welds just as in Figure 4. This permits a weld to be made in the upper fixture while the lower one is being unloaded and reloaded. As the weld around the cup is

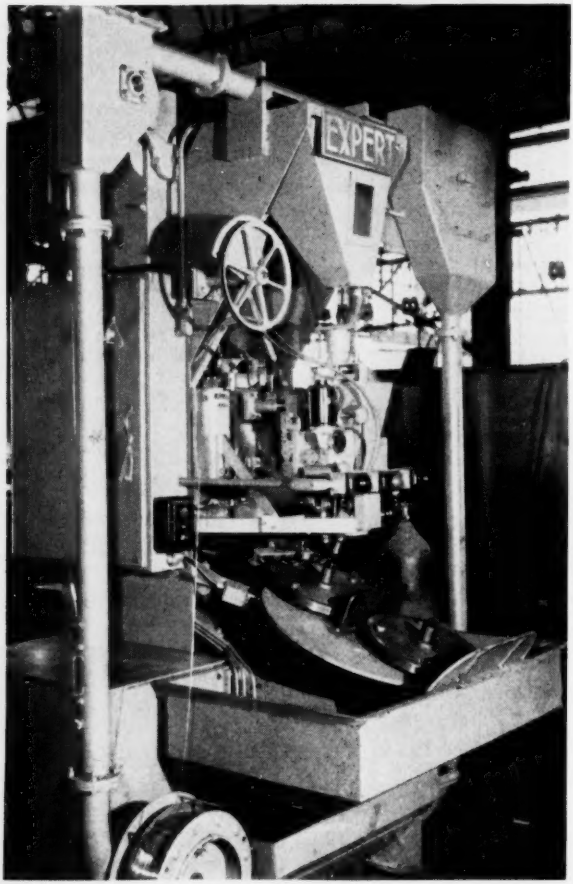

Fig. 3—In this machine equipped with two fixtures on an inclined indexing table, the front fixture is unloaded and reloaded while welding proceeds in the upper fixture. Unfused flux drops into the hopper below and is screened, elevated and reused.

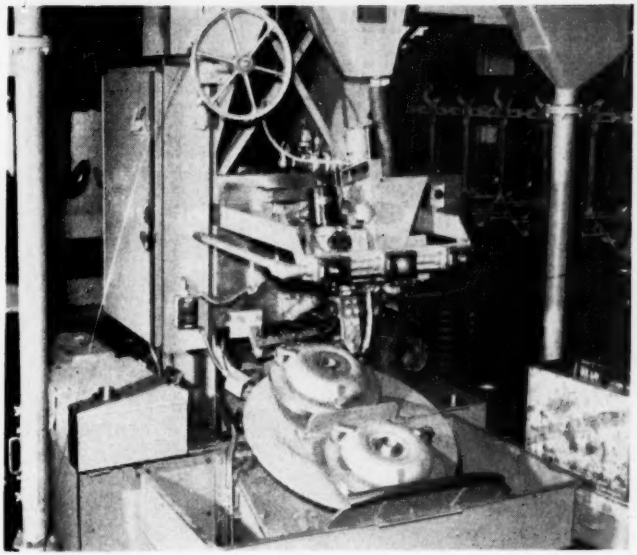

Fig. 4 — Close view of the same setup shown in Fig. 3 but with both fixtures loaded. A weld has just been completed in the upper fixture and the head has rocked out of the way so that the table can be indexed 180 degrees and bring the lower fixture into welding position.

smaller than that on hubs but is made at the same *lineal* speed, welding time is correspondingly shorter, and the cycle faster than for the hub weld. Time for unloading and reloading is about the same.

As the cup weld is subjected to oil pressure in service the weld must be oil-tight; hence, each weldment is checked when submerged and with air pressure inside the assembly. If a leaker is found, the fillet weld is removed by a turning tool and a new weld is made.

In all the welding described, flux fusing over the weld bead is only lightly adherent and either drops off the weldments in handling or is easily jarred off when they are struck a light blow with a hammer by the operators who unload the weldments. All welds are of high and uniform quality and the high current density supplied in automatic welding provides deep penetration. All machines are served by 600 amp DC generators.

Except in welding hubs to impeller shells, an overlap of about ½ inch is made as this reduces almost to zero the chance of a defect or leak where the two ends of circular welds meet. This overlap is made without trouble as the electrode adjusts itself automatically to the slightly larger diameter of the overlap.

Automatic arc welding not only provides strong joints at low cost and at a high production rate but permits the use of types of construction and assembly that would be difficult and more expensive if arc welding were not used. Machines described have proved to be efficient production tools.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.

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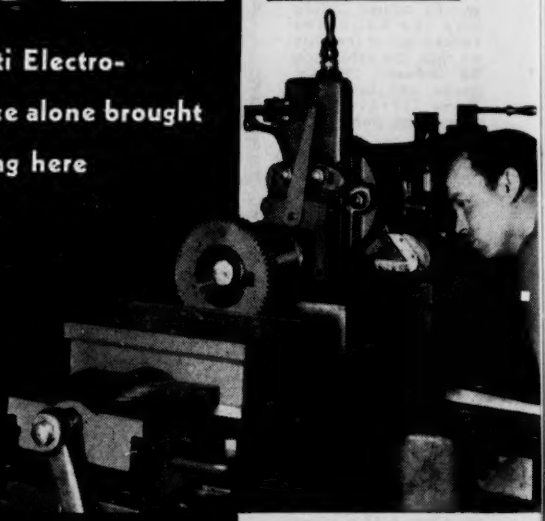

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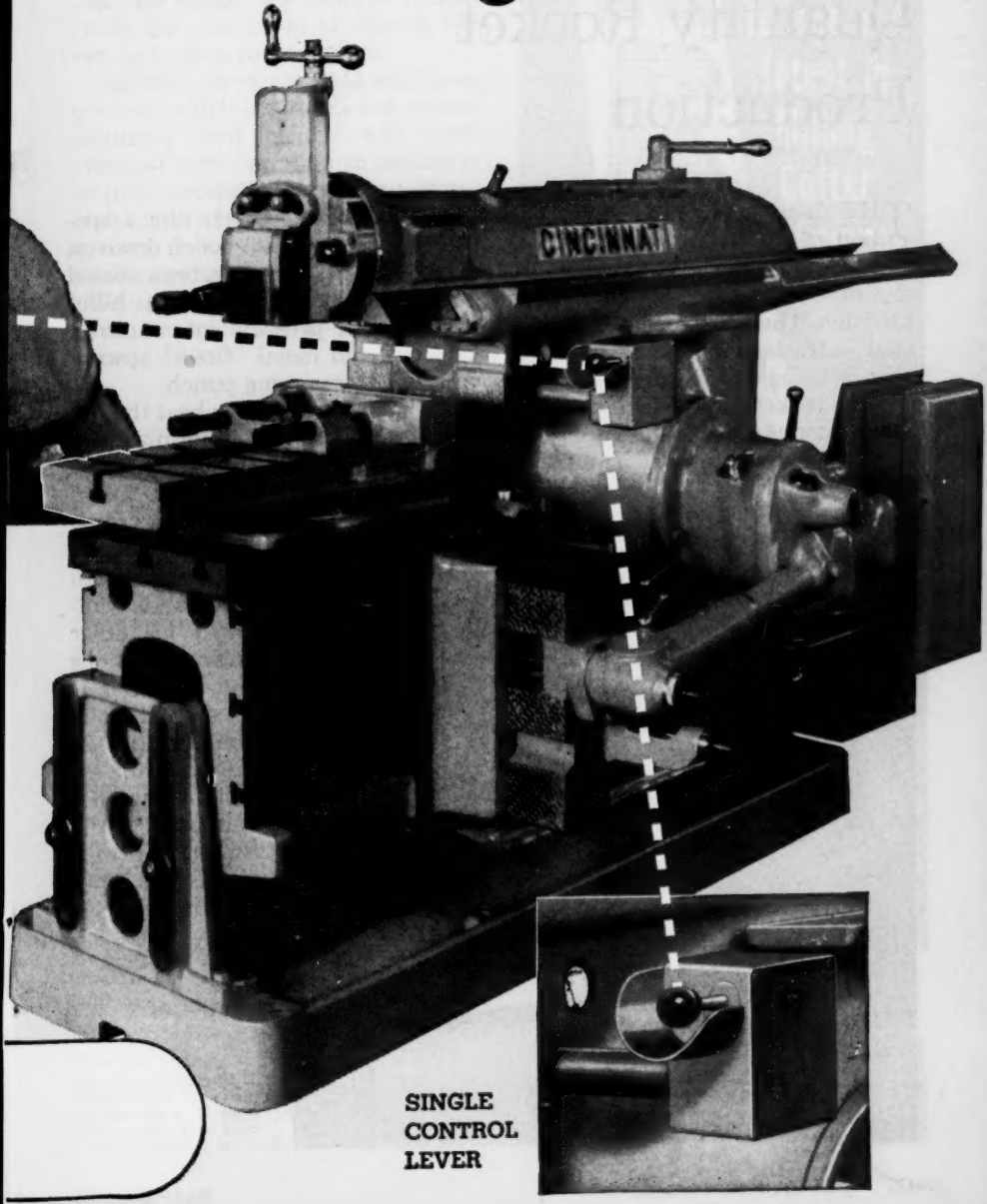

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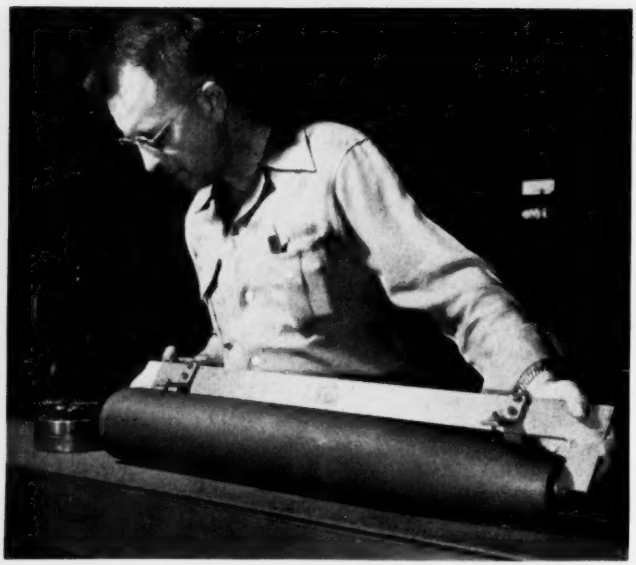
New Process Assures Quantity Rocket Production

THE demand for greater production of 4.5-inch rockets is being met through the use of a revolutionary new process at Pontiac Motor Division. The new process, known as cold extrusion or backward extrusion, is being utilized for production of the rocket head. Considered a major manufacturing advance, Pontiac has one of the few installations in the world today. An improvement over the well-known cold draw process, cold extrusion is accomplished on giant presses which ram a specially hardened steel punch down on a steel billet, which has been coated to eliminate friction. The billet drops under pressure into a cavity and the cold metal "flows" upward around the ramming punch.

It is not necessary to heat the billet to accomplish this forming. Instead, through pressure, it is possible to do with steel what a child would accomplish by pushing his finger into a jar of modeling clay.

The extrusion process is followed by other draw operations and the head is then trimmed and threaded at each end for attaching the nose and body of the rocket. Threading is the only machining operation necessary.



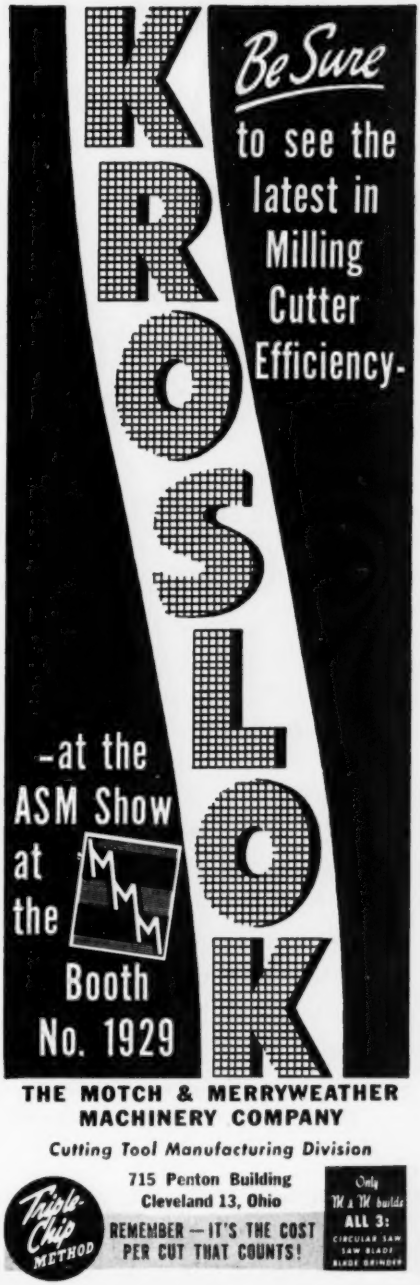
The head for the 4.5-inch rocket shown here is produced by cold extrusion process.

The extrusion process delivers the head to specifications for both inside and outside diameters. Pontiac produces the entire rocket, ready for arming, in an almost 100 per cent conveyorized plant.

Advantages of the cold extrusion process, which engineers and manufacturing men believe will have eventual wide adoption in industry, include production of a uniform, high-quality product with important savings in production time, labor, equipment and metal. Because of the elimination of machining, there is minimum metal loss and no scrap or chip problem.

Success Through Welding. Published by The Lincoln Electric Co., Cleveland 17, Ohio. 50 pages. Illustrated. Paper covers. Price, 50 cents in U. S. A.; 75 cents elsewhere.

This is a booklet of business success stories dedicated to America's small businessman. It is estimated that the country has over nine million small business concerns with fewer than 25 people. The stories of how 25 of these small businessmen have succeeded are told in the booklet. The businesses all happen to have in common the fact that the arc welding process created the opportunity for these successful businessmen to realize their ambitions. Nevertheless, the success achieved by these businesses is retold in these stories not to glorify an industrial process but rather to point out that today there still is opportunity in the American tradition of free enterprise and that success comes through perseverance, ability, hard work, and individual initiative in thought and action.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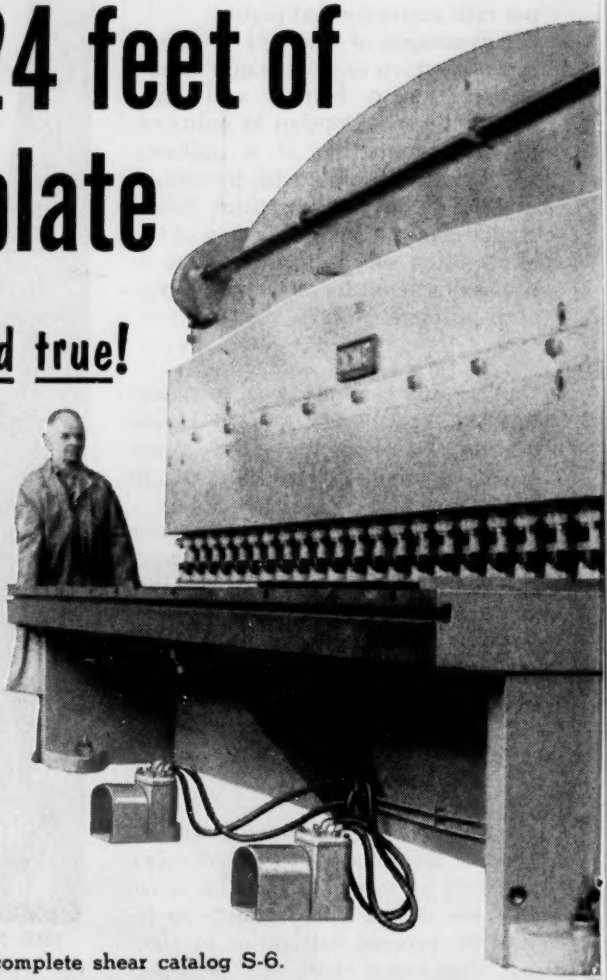

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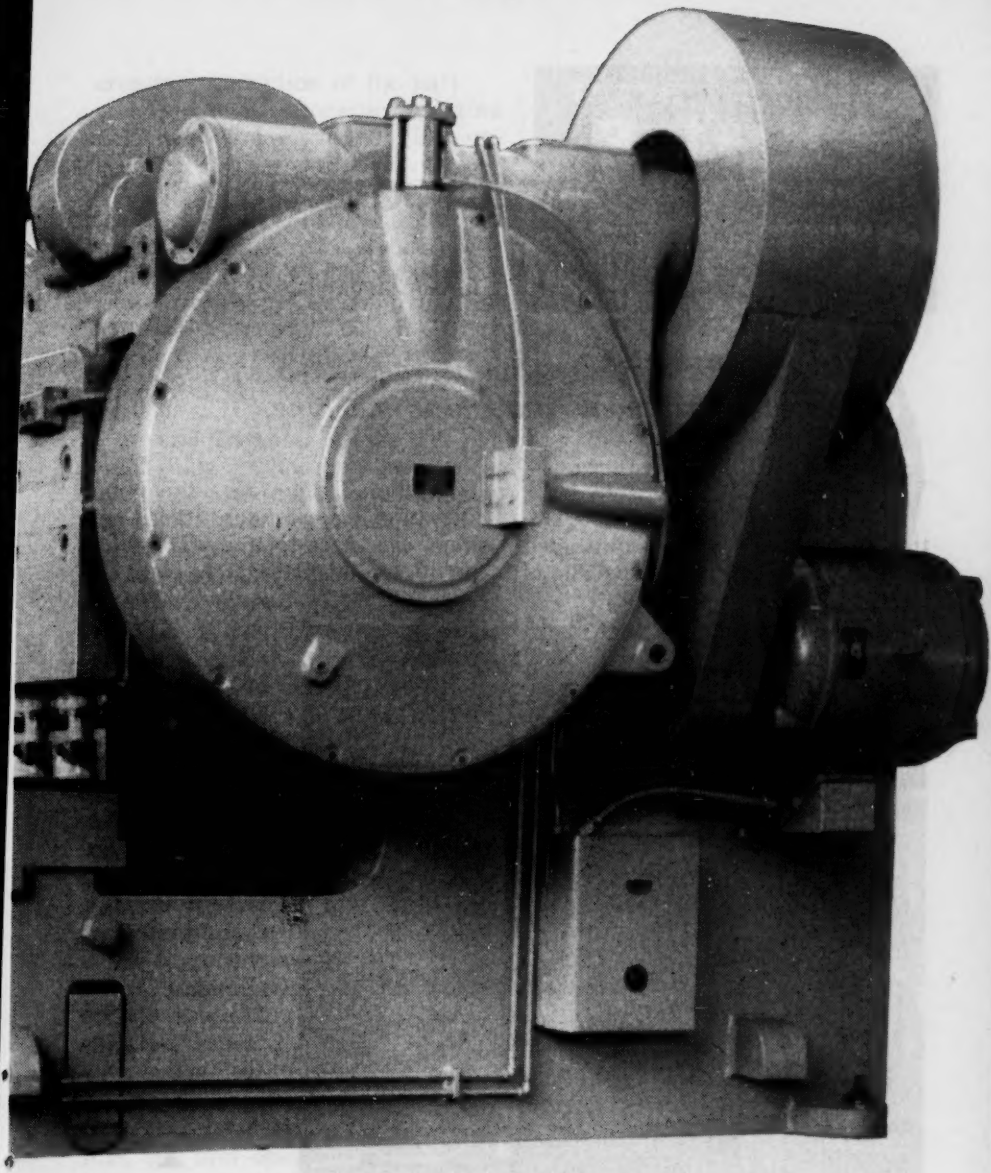

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Caterpillar Increases Gear Production With Standard Tooling

Deburring of gears greatly facilitated through use of standard model automatic machine.

WHEN a small uniform chamfer in addition to a burring operation on gear teeth was recommended by the Engineering Department of Caterpillar Tractor Co., the possibility of using a standard tooled machine was investigated. The high cost of special tooling, the need for early delivery, and the type of application brought up the always - difficult problem of doing a highly specialized job with standard machinery. If a machine could be used on this chamfering operation, it would eliminate hand filing of these burrs reducing cost while in-

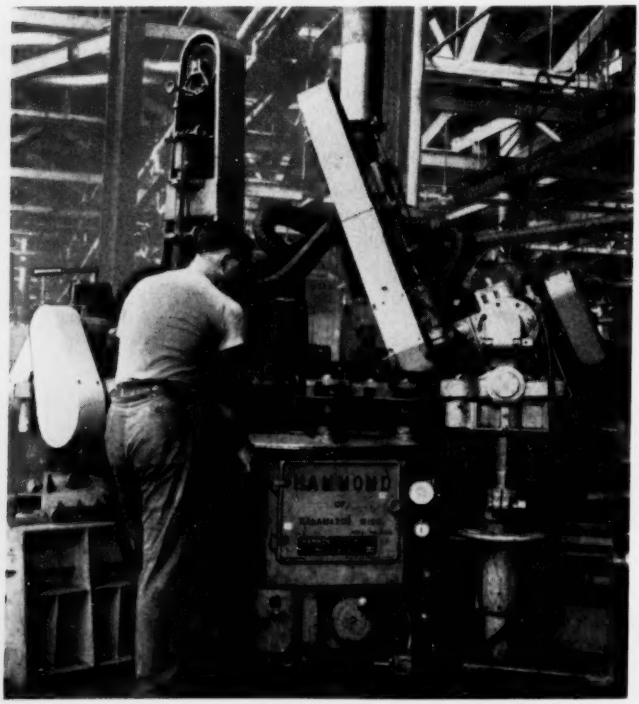

Illustration showing standard automatic deburring machine being used to deburr machined gears.

creasing production of the part.

A Hammond automatic deburring machine was selected and put in operation. This new unit, designed and built by Hammond Machinery Builders, was well suited to the job with no changes in the standard setup, and would be equally useful on many other types of deburring operations. No product design change was necessary to perform the deburring operation with the new equipment.

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One standard tooled machine has brought about a better and more uniform product part, production savings, job and operator betterment, and more available manpower for other jobs. With results like these the tremendous need for the designing of standard tools to do many specialized jobs is even more apparent.

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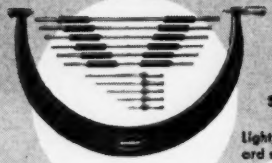

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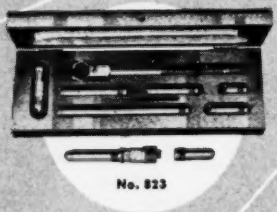

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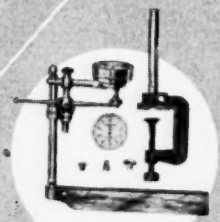

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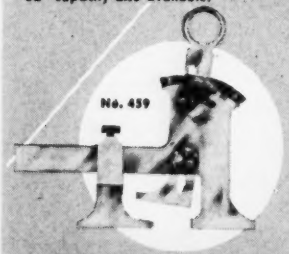

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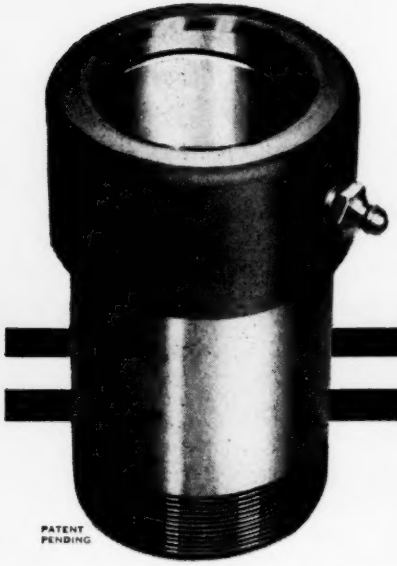

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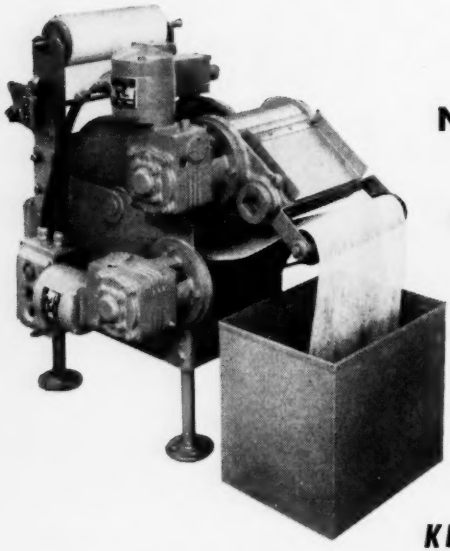

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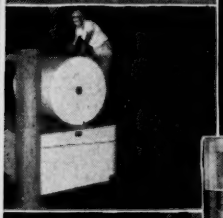

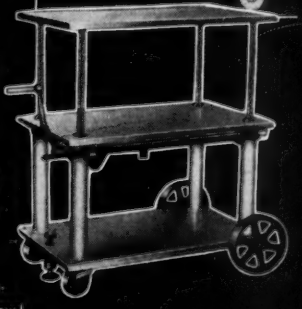

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●

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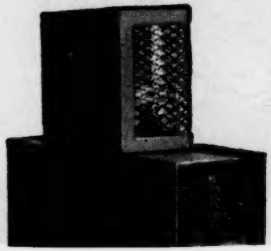

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Work Scheduling Streamlined at Landis Machine Company . . .

RALPH J. COVER*

Effective production scheduling has proved a valuable tool for the men who sell Landis Machine Company products.

THE nature of the equipment made by our firm is such that our customers must often base operating plans in their own factories on the delivery and use of machines they get from us. Basically, the Landis Machine Company makes thread generating equipment. Products in which our machines play important manufacturing roles figure in every phase of American life, ranging from airplanes to washing machines. Our line includes 90 different threading machines of all types, 120 sizes and styles of thread cutting die heads, 30 sizes and styles of tap bodies, 123 sizes and styles of tap heads, 17 sizes and styles of solid adjustable taps, and hundreds of special attachments and applications.

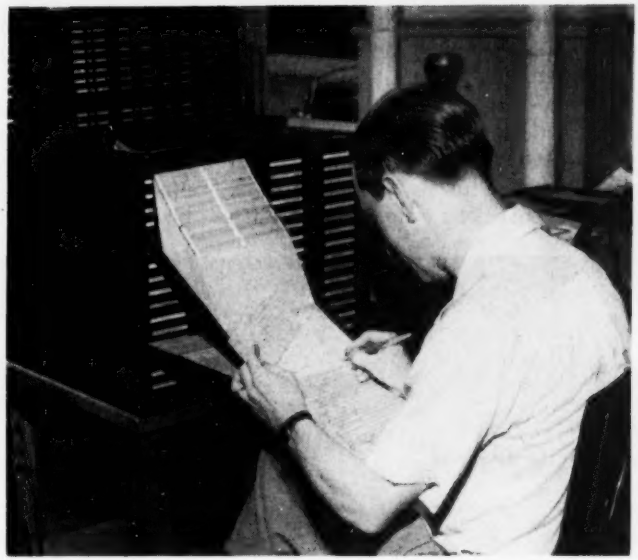
Ralph J. Cover

Like other manufacturers of tools and equipment, we found ourselves at the end of World War II in a situation where our production facilities were greatly overloaded. It was during this period, when we were trying to get top production out of facilities which were limited despite the fact that we were expanding and modernizing them as rapidly as possible, that we were convinced of the need for a workable production scheduling system.

Our problem was made especially acute because until that time our production supervision facilities were carried largely in the heads and hip pockets of employees who had been with the company since its early years. Our rapid postwar expansion carried operations too far beyond the scope of their memories. We realized too that delayed deliveries due to factory bottlenecks were detrimental to customer relations in a market which by 1949 had become highly competitive.

We were able to solve our problem best by setting up a detailed produc-

* Supervisor, Methods and Planning.



The first step in processing a shop order is to check the Kardex records to see which parts or machines are in stock.

tion control system on Remington Rand Sched-U-Graph boards. These boards consist of a series of 40-inch wide pockets with visible acetate margins at the bottoms. Boards with 50 pockets each proved ideal for our needs, since this covers almost exactly the number of machines in our plant for which we need production schedules. A separate line on the Sched-U-Graph boards is devoted to each controlled operation.

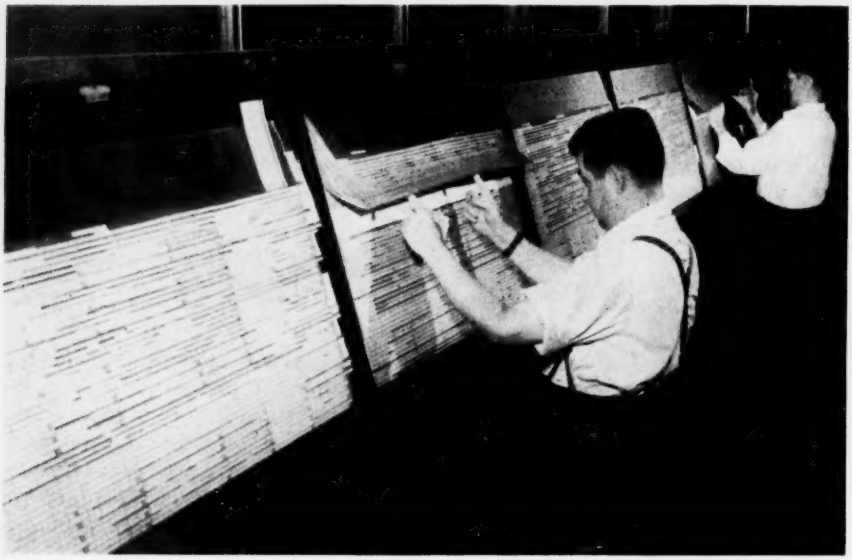
In each of these pockets we insert printed date schedules. These are narrow forms which fit comfortably into the visible margins at the bottoms of the pockets. They are ruled into sections—1 to 31—representing days. Each day is divided into 10 parts or work units for scheduling purposes. In setting up the pockets, we arrange them to match our actual working calendar. The dates for Saturday afternoons and Sunday are cut out of the charts, as are holidays.

Our row of eight boards controls more than one year of production time. The first three months of this time is listed and adhered to in close detail. Beyond that the scheduling is rougher, but proves valuable in estimating our ability to take on work, and to deliver on long range projects about which our customers constantly inquire. Wherever possible, we keep an adequate inventory of finished products and parts to meet anticipated orders for a few months. Inventory records for these finished products and for all our raw materials are kept on Kardex equipment, also supplied by Remington Rand.

Any work orders for our plant are processed first in the materials control section of the production department, which keeps the Kardex records. All parts and machines, covered by a given order are checked immediately in the Kardex records. The amounts called for on the order are marked with a penciled notation. If subtracting the ordered amounts brings our inventory level below par,

procurement arrangements are made to replenish the stock. These procurement arrangements, in the majority of cases, mean the issuing of shop orders for the manufacture of additional parts or machines in our own plant. This is where the planning department enters the picture.

Before scheduling any production, planning department personnel check carefully on the Sched-U-Graph boards to see what time is available. Work schedules are then entered on the job control card and also posted on the Sched-U-Graph boards. In scheduling work on the



The work load for every station in the plant is controlled on the Sched-U-Graph boards shown here.

The first step here is to make out a job control card, which is kept active until all factory work is completed on the order. Initial information entered on the job control card includes the job number, a description of the items to be manufactured, and the number of pieces to be made. On the back of the card, space is provided for the listing of the estimated number of hours, together with the dates on which the work will be started and completed.

boards, we use a specially designed insert form with a ruled time scale at the bottom margin, corresponding with the scale in the scheduling pockets.

Job information, including estimated hours, job number, and dates of start and completion, is entered in one corner of these scheduling forms. The insert card is then cut on the ruled scale to correspond with the process time required. When this card is inserted in the pocket, a

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Stock sizes cover range 0" to 8"

Larger sizes available

Adjustable Limit Snap Gages

AGD designs in both regular and midget models.

Also . . .
Master Setting Gages
Comparators
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and Others . . .
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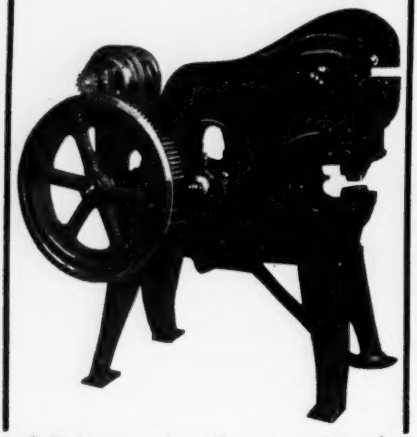
Punches and Shears PROVIDE . . .

- *Simplicity of Operation*
- *Fast Action*
- *Profitable Performance*
- *Long Service at Low Cost*



• Built in seven sizes, these rugged punches and shears are equipped with punching attachment, adjustable stripper, back gauge and shear blades for flat and round bars.
Quick acting four jaw clutch provides for a clutch engagement at every quarter turn of the main gear . . . means faster operation. Can be arranged for notching and coping angles. Will handle many other special jobs most efficiently at low initial and operating cost.

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black border is visible in the margin above the ruled work unit scales, indicating work scheduled for the particular machine or station.

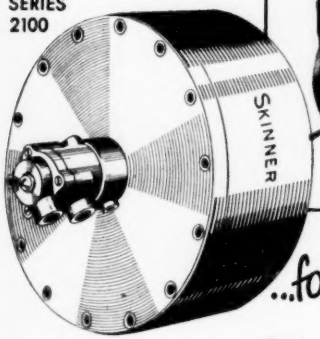
After all job requirements are entered on the Sched-U-Graph boards, the planning department types a list of the job numbers and the sequence in which they are to be run, thus supplying the shop foreman with a work schedule for each production machine in his department.

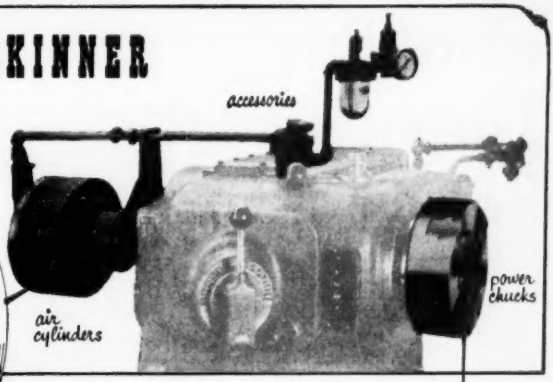
The planning department can also keep top management properly informed, as to the capacity available and required to handle peak loads. With this type of information available, the need for new equipment or overtime schedules becomes readily apparent. Corrective measures can then be initiated in time to prevent serious delays in production.

With these boards keeping track of our current work loads and our ability to take on future production, our sales department can speak authoritatively in dealing with customers who want to know when they can expect delivery on Landis equipment. Our salesmen have developed a reputation for representing a company which carries through on its delivery promises. This customer confidence is a valuable "kicker" in selling any product competitively.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.

SKINNER





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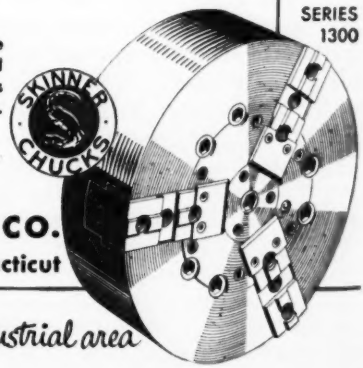

THE SKINNER CHUCK CO.
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More Production Through High Velocity Turning

Jones & Lamson spearheads research and development program on high velocity turning.

THE results accruing from a research and development program conducted by Jones and Lamson Company clearly indicate the need for taking another look at accepted machining practice with a view toward setting up new standards and the establishing of a new yard stick for measuring turning values. This observation is based on the experience gained since the inception of a research program at J & L in 1945, at which time three 16-inch Fay lathes, powered with 75 h.p. motors, were built for use in conducting a series of high velocity turning tests.

In the belief that research conducted on very high alloy material could effectively be applied to lower alloy materials, a New Departure outer bearing race, forged from SAE 52100 steel, was selected as the initial workpiece. Ordinary turning practice called for machining at the rate of 200 to 300 surface feet per minute. The engineers conducting the research program proposed machining of this high alloy material at the rate of 1100 surface feet per minute. They started with flat top cutting tools, and went by 1-degree increments to 10-degree negative rake, and by 1-degree increments to 10-degree positive rake. For this application they discovered that a 3-degree negative rake was the most satisfactory for turning and facing tools, and that a 2-degree positive rake was the most satisfactory for boring and ball groove forming tools.

The next step was to run tool life tests using various combinations of feeds and speeds from 100 surface feet to 200 surface feet. After running exhaustive tests, it was discovered that the most satisfactory speed for cutting this particular alloy was between 600 and 700 surface feet. This high velocity turning has since been confirmed in actual production operations.

By using 670 surface feet and 0.024 feed for turning SAE 52100 steel, 250 pieces could be machined before requiring grinding of the cutting tools. On the ball groove forming tool, it was discovered that 0.006 feed per revolution was the maximum that could be used; but with reduced feed at 945 surface feet, 250

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pieces could be obtained before grinding of the cutting tools became necessary.

Since the cutting life is basically controlled by two elements — heat and wear — special attention was given to cutting compounds. All turning was done using a water soluble cutting compound containing a wetting agent.

J & L engineers have found through their research in high level turning that it is possible to cut or separate a given amount of metal with less horsepower, with a higher degree of finish, with a higher degree of accuracy of the finished workpiece for diameter and concentricity control, and with less distortion of the surface structure of the finished workpiece.

Another interesting workpiece selected for testing in the J & L research and development program was a Ford rear axle bevel stem pinion drive gear. This part was made from a forging of SAE 8620 steel. Initial experiments were conducted with the workpiece running at 600 surface feet on the outside diameter of the bevel gear. It was discovered that the workpiece was running too slow since the material was welding to the cutting tools. When the speed was increased to approximately 900 surface feet on the outer diameter of the bevel gear, results were entirely satisfactory. Satisfactory results were also obtained when the speed was increased to approximately 1000 surface feet and then to 1200 surface feet.

J & L engineers discovered that by increasing cutting speed from 900

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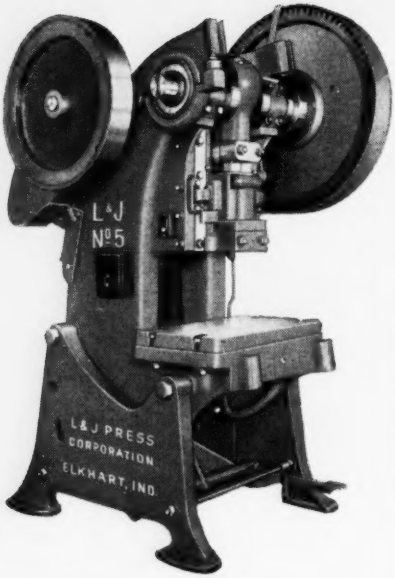

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to 1200 surface feet, which is equal to 33-1/3 per cent increase, the horsepower requirements only increased between 9 and 10 per cent. In checking the diameter of every 10th piece, they found that the sizes did not vary from one piece to another. Unlike the damaged surface usually encountered on the surface of a workpiece, by increasing the speed to 1000 surface feet, the grain structure remains as it was when the forging was made, right up to the surface of the piece.

The J & L engineers who head up the research and development program caution that machine operators not be expected to double the speed and step up to high level turning without having the opportunity to see material cut at high speeds and feeds. When an operator has been running a job for years at 250 to 300 surface feet, he must be reindoctrinated. High velocity machining requires an educational program for machine operators and mechanics that are actually doing the work in the shop. It requires an educational program on tool grinding so that rake angles, clearance angles and chip breakers will be ground uniform from one tool the the next, and after these factors have been established, that they be maintained. It requires education of shop supervisors, methods, shop management, and, last but not least, top management.

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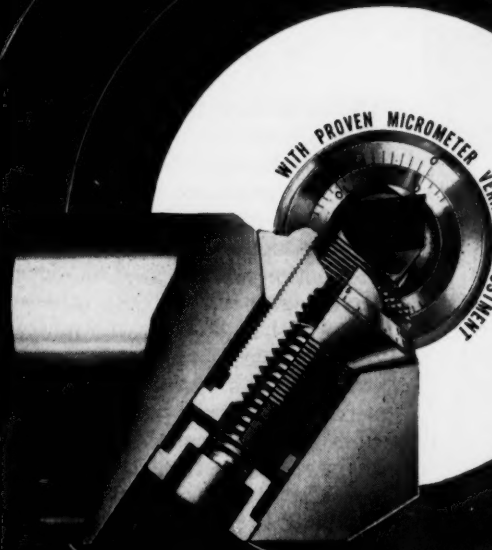

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Grinding Safety– to Reduce Pro

Practical suggestions de of grinding

By Arthur L. McAlister

WITH very little additional effort, the program in your plant through which you maintain safe grinding practices, also can be the means of discovering new ways to cut production costs. Grinding as a production process need not cencede anything to any of the other machine tool methods in the matter of costs, and in a great many cases the evidence is in favor of grinding as being the less expensive method. Nor does grinding need to take second place when work quality is under consideration.

Grinding is this good, especially when conditions are nearly ideal. However, this situation prevails in relatively few of the hundreds of thousands of grinding operations in industry today. Therefore, there is considerable opportunity in the average grinding department for improving efficiency and cutting costs. By making the plant safety program carry the slight additional load of discovering new cost corners to cut, less efficient operations can be made to operate far more effectively and may even be brought remarkably close to perfection.

This is not to side-step the primary objective of the safety pro-

An Opportunity duction Costs

signed to improve efficiency operations.

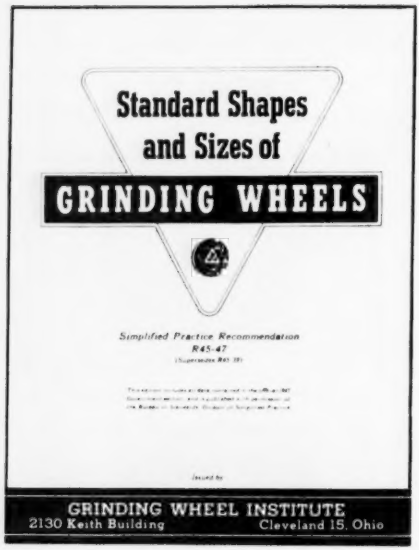
gram, which is simply the humanitarian desire to offer maximum protection to the worker. Nor is it to say that management has overlooked the next obvious corollary of safety, that when accidents occur valuable man-hours are lost.

Rather, it is to emphasize the practical possibility of worthwhile rewards to be won by intelligent methods analysis which are carried on simultaneously with safety inspection routines, and with the full cooperation of those primarily responsible for plant safety.

For example, good grinding wheel safety practice calls for inspection of each grinding wheel shipment as soon as it is received by the user. This inspection includes "ring testing" of vitrified bonded abrasive wheels. The "ring test" is used to detect hidden cracks which can be sustained when a vitrified bonded grinding wheel is subjected to severe shock, such as being dropped. The wheel is suspended by its arbor hole, and is struck with a non-metallic object along its vertical center line. An undamaged wheel will emit a clear, resonant tone. But if it is damaged, a dull thud will be heard.

Worker protection is not the only

benefit of this kind of careful scrutiny of an important production tool, grinding wheels. For the grinding wheel found cracked in a mishandled shipment represents money saved to management if it can be kept out of the grinding department, since valuable production time is always lost when a wheel breaks in use. This concept of economic safety is so obvious that it is apt to be overlooked.



Another important safety practice is careful inspection of the wheel flanges or sleeve, spindle bearings and other moving parts, before the wheel is mounted. This routine check not only safeguards the worker, but can be made to reveal, for the benefit of the maintenance foreman, exactly when a certain piece of equipment needs attention. By devoting more attention to maintenance, it gives direct help to continuing lower cost production by preventing a major machine breakdown from occurring at a critical time. But this benefit results only if there is close liaison between the safety engineer, or inspector, and the maintenance foreman. By keeping each other constantly informed of their findings, vigor can be lent to the efforts of the safety engineer, and the performance of the maintenance function can be kept at top level with greater assurances of continuing production. Very often the safety engineer will be the first to suspect that a particular machine needs maintenance earlier than the schedule indicates—a valuable piece of information for the maintenance foreman.

Safety is still an important consideration after a new grinding wheel has been properly mounted and given the customary one-minute "run-in" test with all personnel standing clear. As long as machines and men work in close proximity to each other there can be no relaxation in safety efforts.

Take the matter of grinding machine speed. If the governor on a pneumatic tool becomes misadjusted from some cause, such as dirt particles or operator inexperience, not only will the overspeeding of the wheel result in dangerous working conditions, but the wheel will in most instances be operating beyond the speed at which it is most efficient as a cutting tool. It is by no means universally true that the faster the grinding wheel speed the higher the rate of stock removal. Often quite the contrary situation exists, with the most efficient cutting speed for a given wheel being somewhat lower

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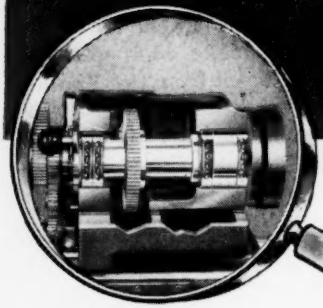

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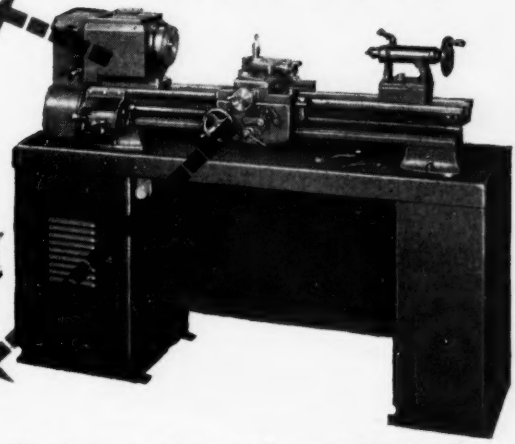

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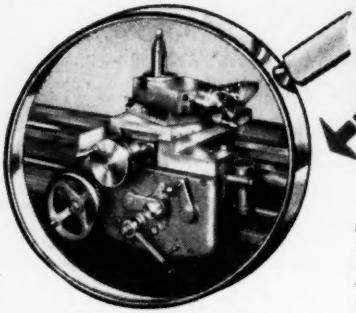

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The closer you inspect this new 12" swing Logan Lathe, the *better* it looks. The advanced design of individual parts, and the precision construction throughout become more evident. You will like the size, too. Its 35" center distance, 1⅜" spindle hole, 1" collet capacity, and rugged, massive proportions mean extra capacity, stability and power. Keep this newest Logan in mind as you make plans for your production line, tool room, shop, or student training program. The quality you see in your close-up look will serve you well through extra years.

Brief Specifications of Logan 12" Lathes

Swing over bed and saddle wings, 12" ... Center Distances, 23" and 35" ... Turret Lathe Models have 43" bed length ... 1⅜" spindle hole ... 1" collet capacity ... 16 spindle speeds, 38 to 1260 rpm.

Get full facts—See your Logan Dealer—or WRITE to

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"EXTRAS"
Pay off in PRODUCTION and
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Here each roll of Atlantic raw band saw stock is subjected to initial quality control tests.
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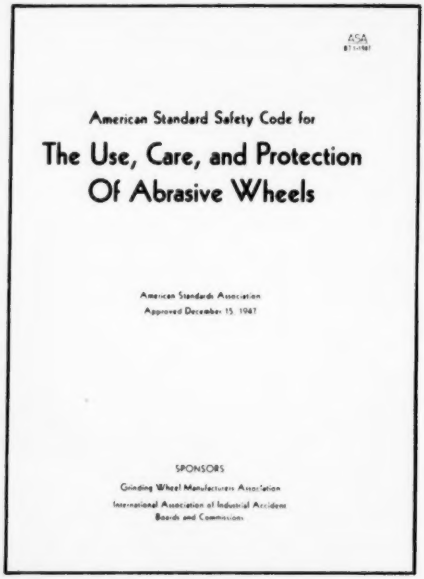
than the maximum rated wheel speed.

What the optimum wheel speed may be in a particular setup will depend, of course, on the many variables which make each grinding operation different from every other. Obviously, then, checking grinding wheel speed in the interests of safety



ASA

American Standard Safety Code for

The Use, Care, and Protection Of Abrasive Wheels

American Standards Association
Approved December 15, 1947

SPONSORS

Grinding Wheel Manufacturers Association

International Association of Industrial Accident Boards and Commissions

also opens the way for consideration, and sometimes determination, of what in that instance is the most efficient wheel speed. Costs, of course, begin to drop when the wheel operates at the optimum speed.

Grinding imperfections offer another good example. They are a certain cause of rejects, which in turn raise production costs. In a great many instances these imperfections, such as short wave marks, long wave marks, and so on, result from vibration in the grinding machine itself.

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Such vibration not only can cause imperfect grinding results, but often is symptomatic of a dangerous working condition which should have the immediate attention of the safety engineer. Here again, close liaison between the safety engineer and production engineer can serve the purpose of both to good advantage, and improve the cost picture considerably.

The symptoms of poor or inefficient grinding often are danger signals for the safety engineer, and conversely, what the safety engineer discovers needs attention by his department often is of the utmost interest to the cost-minded production department. If all plant personnel involved in safety, maintenance, and production were to carry that thought with them constantly, safety records could be kept high and production costs brought lower than had ever been thought possible.

The Grinding Wheel Institute, composed of the majority of the leading grinding wheel manufacturers, has made available numerous booklets and manuals covering important phases of grinding technique and grinding safety. The grinding wheel user is invited to write for any or all of the following pamphlets listed below, which are available at no charge from the Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio.

1. Grinding Wheels: Standard Shapes and Sizes of Grinding Wheels. (Simplified Practice Recommendation R45-47, National Bu-

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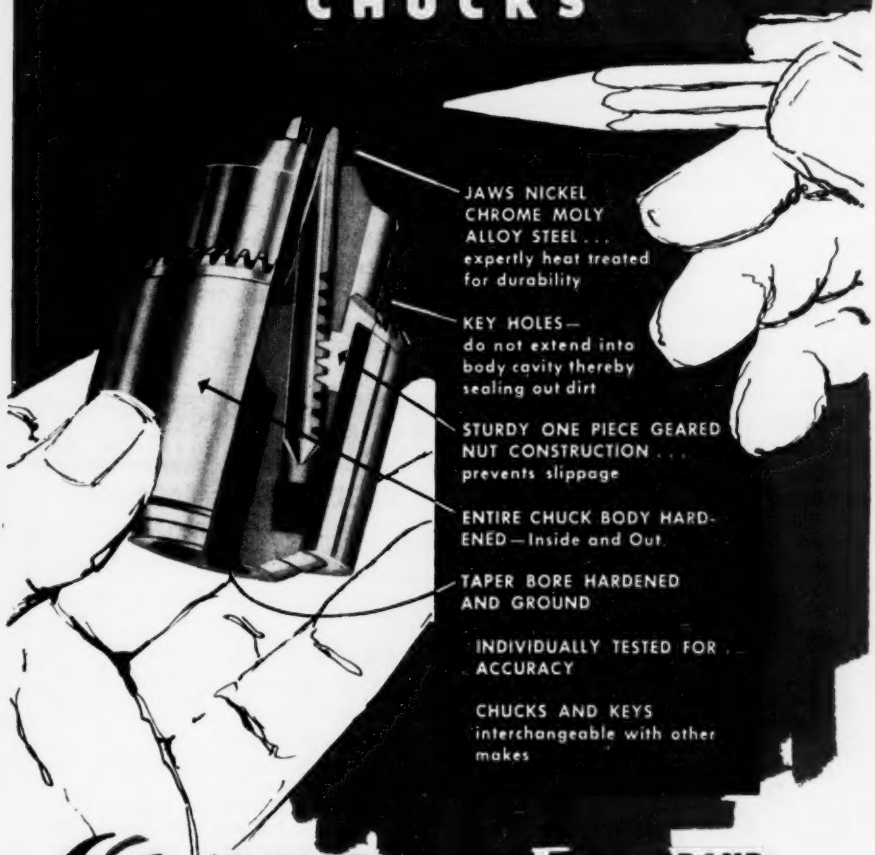

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CHUCKS AND KEYS interchangeable with other makes

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THE CHUCK THAT LIVES UP TO ITS NAME . . . SUPREME

reau of Standards.) Lists standard grinding wheel shape types, with detailed dimensions. All wheels listed also are classified according to basic uses.

2. American Standard Safety Code for the Use, Care and Protection of Abrasive Wheels. (American Standards Association.) ASA B7.1-1947. The scope of this publication includes rules and specifications for protection hoods, flanges, chucks, and revolving cup guards, and rules for their proper storage, handling and mounting of wheels. It gives minimum arbor sizes and maximum safe operating speeds of grinding wheels.

3. Specifications of Segments used in Chucks. Contains diagrammatic sketches of chucks, showing the holding mechanism as well as complete dimensions for all standard shapes listed.

4. Mounted Wheels and Points: Safe and Efficient Operation, Critical Speeds. Lists all standard mounted wheel shapes, giving general rules for safe operation together with tables of critical speeds.

5. Disc Grinding: Safe Rules and Methods. The purpose of this booklet is to describe the special features of disc grinding, and to illustrate recommended practice with respect to mounting procedures and the use of safety techniques.

6. Handling, Storage and Inspection of Grinding Wheels: Safe Rules and Methods. Presents proven methods and rules to follow for the safe storage, handling and inspection of grinding wheels.

7. Mounting Techniques for

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The BARKER "MILLER"

PRECISION - PRODUCTION - ECONOMY

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Wheel Sleeves on Cylindrical Grinding Machines. Deals exclusively with the elimination of wheel breakages on cylindrical grinding machines by recommending the specific amount of "wrench pull" for the operator to use when mounting wheels on each of the more common types of cylindrical grinding machines.

8. Cutting-Off Wheels. This booklet covers usage, classification, machine and wheel speeds, and wheel mountings as well as other subjects such as techniques and handling of the work. This booklet was prepared by the Safety Committee of the Institute.

9. Portable Grinding Machines: Safe and Efficient Operation. The purpose of this booklet is to outline the conditions that are likely to cause trouble and to provide information regarding the safe use and maintenance of portable grinding machines for both the workman and the supervisor.

10. High Speed Grinding Machines: Heavy Duty Maintenance of Swing Frame and Floor Stand Machines; Large Hold, Organic Bonded Wheels. Outlines in general terms the conditions largely responsible for trouble if not corrected, and supplies information needed to facilitate proper inspection and maintenance of that portion of the equipment that affects the safety of the wheel.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.

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OFFSET KIT
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hollow head set screws
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Popular "Yankee" Offset Ratchet Handle No. 3600 with eight hex key adapters from $\frac{5}{64}$" to $\frac{5}{16}$". Packed in transparent plastic case. Strong "Yankee" ratchet drives or draws 21 sizes of hollow set screws and socket head cap screws, even in extremely close quarters. Ask for No. 3600-9 "Yankee" Offset Kit. Additional adapters available for slotted screws and Phillips recessed head screws. Other "Yankee" Offset Screw Drivers you'll find useful are—Nos. 3400 and 3800 for slotted screws; Nos. 3412 and 3423 for Phillips recessed head screws. Available from your distributor. For circular, write North Bros. Mfg. Co., 202 West Lehigh Ave., Philadelphia 33, Pa.

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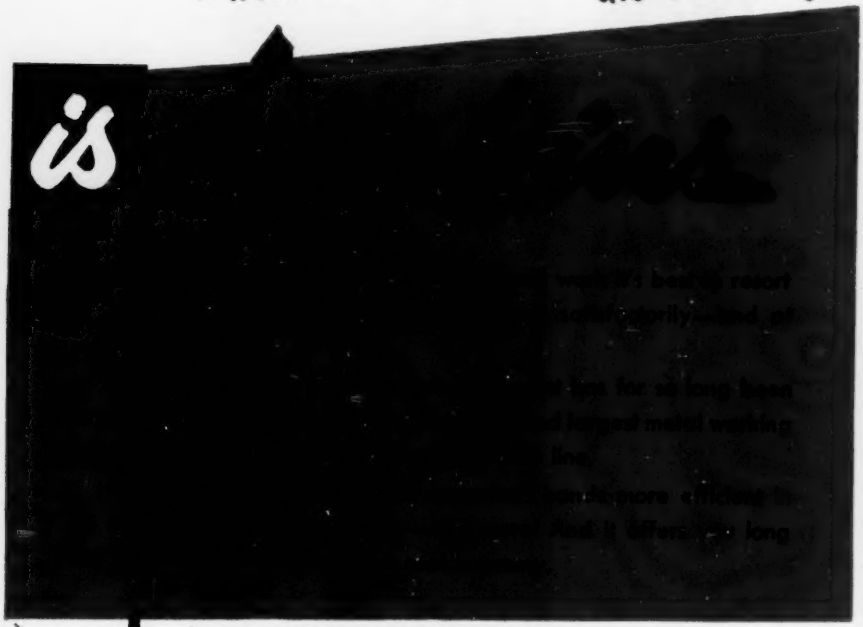

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The engine lathe you buy today could be the one you will call upon for 'round-the-clock production. Make sure, before you buy, that the lathe of your choice can take such punishment.

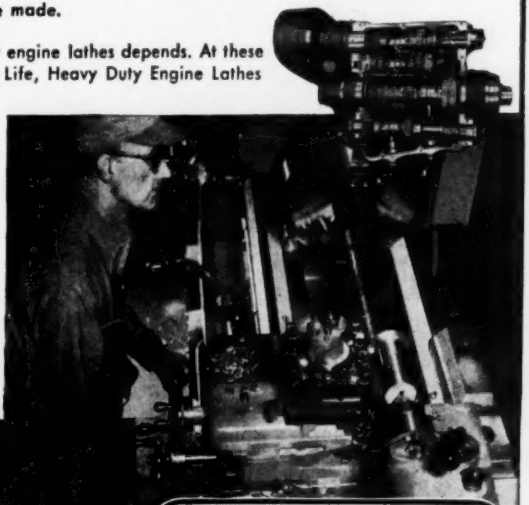
ASK ONE QUESTION!

What is the headstock gear arrangement?

MAKE SURE OF THREE POINTS

(1) That all gears are arranged in a horizontal plane, easy of access.
(2) That gears are in constant mesh, with speed changes effected by means of sliding jaw clutches, eliminating gear wear due to shifting action.
(3) **That the "back gear" is in *front* of the spindle, exerting its powerful downward thrust to offset the lifting action of the tool when heavy cuts are made.**

On these three points long life for engine lathes depends. At these three points Boye & Emmes Long Life, Heavy Duty Engine Lathes excel.



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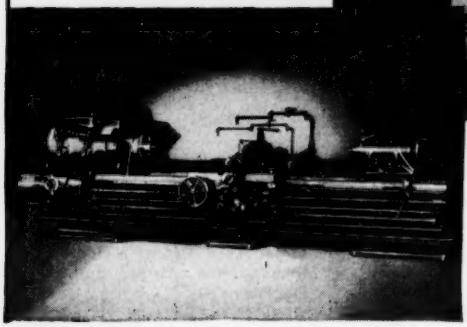
"Back-gear-in-front" guards spindle bearings during heavy cuts.



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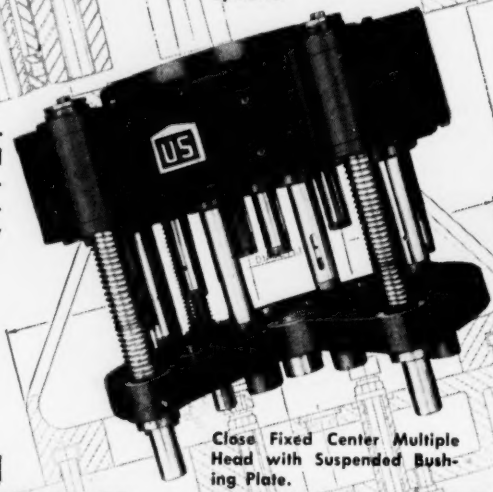

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MODERN Machine Shop 25th YEAR 1928 1953 SERVING THE METAL WORKING INDUSTRY

Anniversary Feature

ON the following pages are detailed descriptions of many special tools which are designed primarily to enable manufacturers to obtain increased production.

Machine Tool Is Specially Made for Drilling and Tapping Tank Case Parts

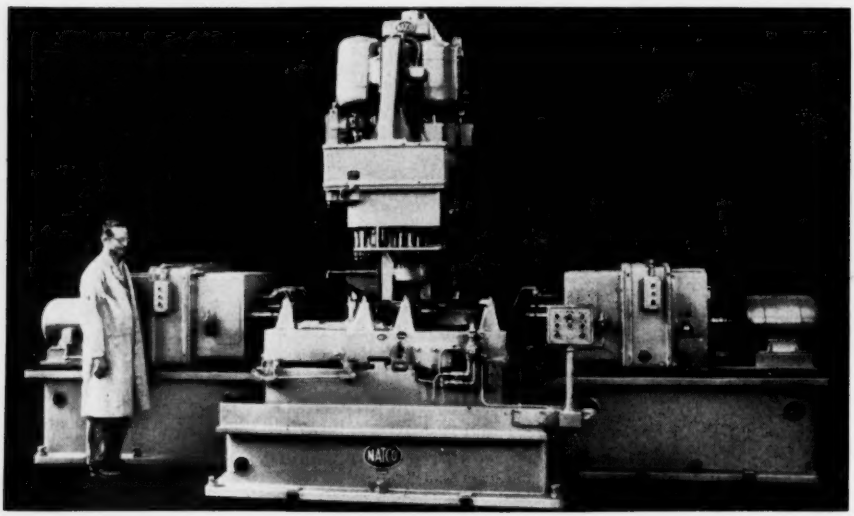
THE National Automatic Tool Co., Richmond, Ind., has developed an automatic "Holetapper" and Driller, specially designed for drilling and tapping right or left-hand tank case parts. The left-hand horizontal head and vertical head perform the following operations on left-hand parts: Position 1, remove and load; Position 3, (vertical head) tap 4 holes, (left-hand horizontal head) tap 4 holes; Position 2, (vertical head) idle, (left-hand horizontal head) tap 3 holes.

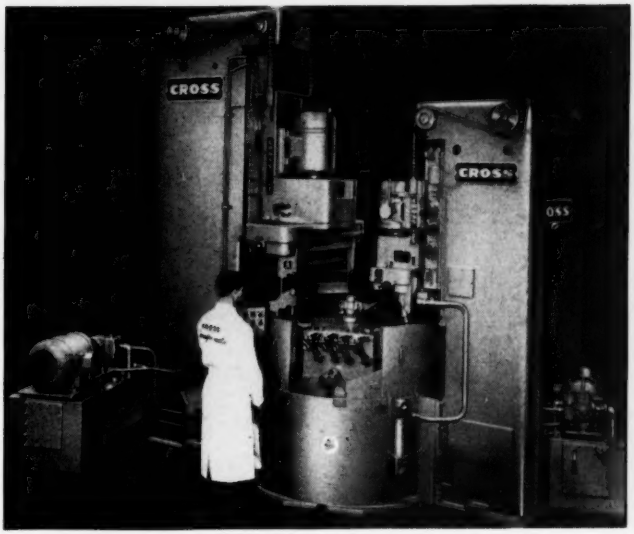
The right-hand horizontal head and the vertical head are arranged to perform the following operation on right-hand parts: Position 1, remove and load; Position 3, (vertical head) drill 8 holes, (right-hand horizontal head) tap 4 holes; Position 2, (vertical head) tap 8 holes, (right-hand horizontal head) tap 3 holes. Each cycle is automatic and easily performed by a single operator with push-button controls.

Special Machine Tool for Drilling and Milling Automotive Connecting Rods

A special machine tool capable of drilling and milling 600 automotive connecting rods per hour at 100 per cent efficiency has been announced by The Cross Co., Detroit 7, Mich. The machine has five stations; namely, one for loading, one for milling the lock slot, and three for drilling the stepped oil hole. Parts are held on a fluid, mo-

This large automatic machine tool is capable of drilling and tapping right or left-hand tank case parts.





This special Cross machine tool is capable of drilling and milling 600 automotive connecting rods per hour at 100 per cent efficiency.

tor-driven index table. Work-holding fixtures are hydraulically operated.

The use of preset cutting tools is said to reduce down time and minimize scrap loss. Other features include hardened and ground ways, hydraulic feed, and rapid traverse. Hydraulic and electrical construction is to Joint Industry Conference standards.

Special Band Machine Is Remotely Controlled for Hazardous Operations

TO solve difficult and highly special band sawing and band machining problems not within the scope of its many standard models, The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., manufactures special band machines to customers' orders. Typical of some of the "specials" produced is the extra work height, heavy duty model shown in the illustration. This machine, manufactured for a U. S. Naval Ordnance Test Station, will be used to cut explosives (shells, and so on) apart to permit inspection of their interiors. To offset the possibility of harm to the operator should an explosion occur, the machine is arranged for remote control from a relatively distant point of safety.

This special band machine was adapted from DoAll's most versatile model (the MP-20) which accepts band tools for filing, grinding, and polishing, as well as sawing. However, this special band machine has a work height capacity of 24 inches, a 36-inch stroke, and is equipped with a hydraulically powered, heavy duty table. It incorporates the features of the standard MP-20—variable band speed control up to 10,000 feet per minute; automatic hydraulic brakes which stop the machine when the band tool breaks; facilities for air jet, mist, or flood cooling; hy-

Typical of some of the "specials" produced by The DoAll Company is this extra work height heavy duty model band saw which will be used to cut explosives apart to permit inspection of their interiors.

draulic positioning of the tool guide post; hydraulic tensioning of the saw band to limits controlled by the operator; two-way table tilt for cutting at an angle; and various other exclusive features.

Controls in this band machine, such as the blade welder and complete standard control panel normally incorporated into the column of the standard model MP-20, are housed separately in a remote control panel. The final installation of this separate control unit will permit every phase of the machine operation to be readily carried on at a safe distance from the machine itself.

Saw band speed, speed of the hydraulic table, feed pressure, height of the tool guide post, band tension, tilt of the table, and so on, can all be controlled by the operator from his protected position. Hydraulic lines and wiring between the band machine and the control unit will be encased in heavy wall conduit.

Special Double-End Machine Processes Landing Gear Cylinders

A SPECIAL automatic double-end machine for processing aircraft landing gear cylinders of alloy steel has been developed by Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. The workpiece is roughly cross-shaped, and the processing sequence is rough machining, heat treating, and finish machining.

The machine consists of two double-end machine sections placed side by side. The part is manually loaded and clamped in the fixture and the fixture is loaded into one machine section and power clamped in position. With the part in working position, the operator selects the proper tools and uses them in the required sequence, alternating from one end of the part to the other

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Meets small budgets for new equipment...

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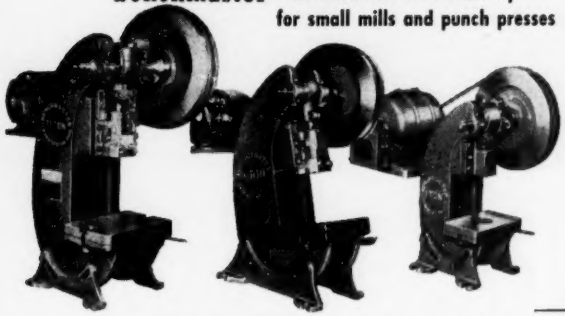
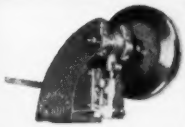
benchmaster The standard of the industry for small mills and punch presses



These rugged, low cost presses have set the world's standards for small presses! Unmatched for economy of operation, high productive capacity and overall performance. More than 50,000 now in use throughout the world in almost every conceivable industry. Available in 1-, 4-, and 7½-ton capacities, 51 models; **Standard and Deep Throat Types.**



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—available in 4-Ton and 7½-Ton models for jobs demanding unlimited shut height.

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—available in all 4-Ton and 7½-Ton models for blanking, forming and drawing operations!

Belt Sander
Ideal for all belt sanding applications. Positive trackage adjustment. Uses belts from ¼" to 1" wide by 44" long. Speeds up to 8000 S.F.M.

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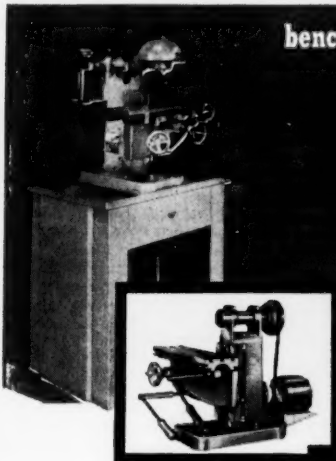

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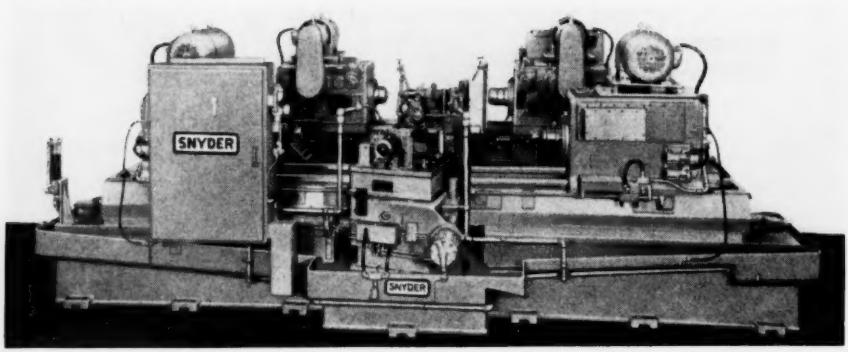

This special automatic double-end machine developed by Snyder Tool and Engineering Company is designed for processing aircraft landing gear cylinders of alloy steel.

so that while an operation is being performed on one end, he is changing tools for the subsequent operation on the other end. The two trunnion ends are hollow milled and centered, and the two cylinder ends are bored, faced, and centered. Carbide and high speed steel tools are used. The two opposite

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Cut costs of Removing Broken Taps

Universally used for removing stubborn, balky taps that break off deep in threaded work. Quick, easy, inexpensive. Will not damage threads. In 2, 3 and 4 flute styles—sizes No. 4 to 1½".

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Reduce Labor Costs for Removing Pipes, Studs and Screws.

For removing broken pipes or studs that defy movement. "Reps" makes a strong four point grip without hammering or pounding. Hardened steel. Pulls rather than reams. In sizes, for every pipe from ⅛" to 2", every stud and screw from ⅜" to 3½".

(*Reps. Tool Company, Inc., a Walton affiliate.)

Sold by leading dealers, or write direct for catalog No. 10 of Walton Tools and details of 30 day free trial offer.

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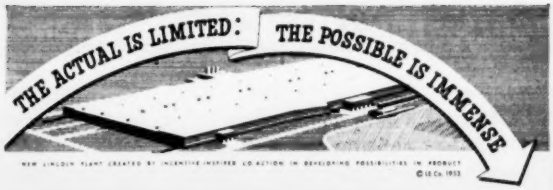

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...specify Lincoln "Fleetweld 72"

Performance proves "Fleetweld 72" welds 35% faster than other E-6012 electrodes . . . cuts welding costs of 3 out of 4 production jobs. And that's not all.

Welds made with "Fleetweld 72" are smoother, of higher quality. And "Fleetweld 72" has good "wetting" action with minimum arc force.

"Fleetweld 72" operates beyond the breakdown point of other rods . . . without overheating, without excessive arc spatter. Its higher melt-off rate and flatter bead give you more mileage or stretch per length of rod than possible in any E-6012 electrode today. What's more, most welds are self-cleaning.

Readily available, "Fleetweld 72" answers the demands of many production jobs normally specified for E-6013 calling for smooth appearance and easy slag cleaning. Selling for less cost per pound, "Fleetweld 72" further helps you meet the challenge for lower welding cost on a host of production operations.

START CUTTING WELDING COSTS—Latest Speeds and Procedures for production welding with Lincoln "Fleetweld 72" are in the Weldirectory 462. Available by writing on your letterhead to Dept. 3504.

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THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

LINCOLN "FLEETWELD 72"

Unique E-6012 Electrode for High Speed Production Welding of Lap and Fillet Welds

Faster, Easier Operation Lincoln "Fleetweld 72" operates with peak efficiency at welding currents substantially above conventional E-6012 electrodes and without danger of breakdown. Weld deposits produced at high melt-off rates are smooth, are slightly convex . . . ideal for all types of flat position production work where duplicate welds must be made in the shortest time to cut shop costs.

Proper Root Penetration The unidirectional arc characteristics of Lincoln "Fleetweld 72" assure correct root penetration of fillet welds . . . with minimum cutting away of the top edge of lap welds, yet without sacrifice in speed.

More Mileage Fleetweld's near-flat bead means top weld strength without piling up weld metal as experienced with other electrodes. This means more mileage per length of rod to cut electrode costs.

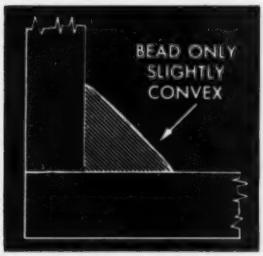

Fig. 1. More Mileage *comes from "Fleetweld 72's" near-flat bead shape. There is no piling up of weld metal.*

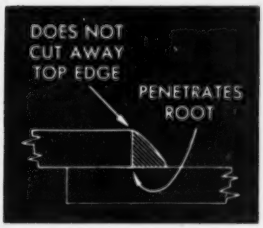

Fig. 2. Quality at Top Speed. *Proper penetration at root is done without cutting away top edge.*

ends of the part are processed in one section, and the fixture is transferred to the second machine section where the other two opposite ends of the part are processed.

Each unit is controlled separately, and the work cycle is automatic. Pressing the start button causes the motors to start and the head to rapid traverse until the feed switch is contacted, causing the unit to feed to depth and automatically return. Feed start dogs and positive stop positions for the heads are selected through a rotating dograil and a movable end stop. The spindle noses in the head are provided with a quick-change lock for securely holding the various tools.

Heads are provided with eight spindle speeds selected by moving two levers and varying from 43 to 416 r.p.m. The shift mechanism is interlocked so that the gearing cannot be damaged by incorrect positioning of the shift levers. The units have a maximum of 30 inches of stroke and are capable of feed rates from ½ to 30 inches per minute.

The units on one section of the machine are also provided with step drilling attachments for the purpose of drilling deep holes in the trunnion section of

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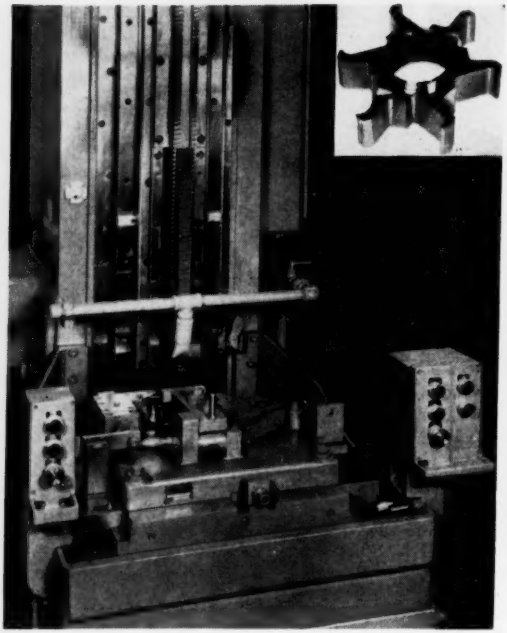


Colonial single-ram broaching machine equipped with special combination manual and automatic fixture for broaching arms on aircraft engine spider (inset)

the part. Each section has its own hydraulic tank and pump and its own hand-operated lubrication system.

Single-Ram Machine Adapted for Broaching Aircraft Engine Spiders

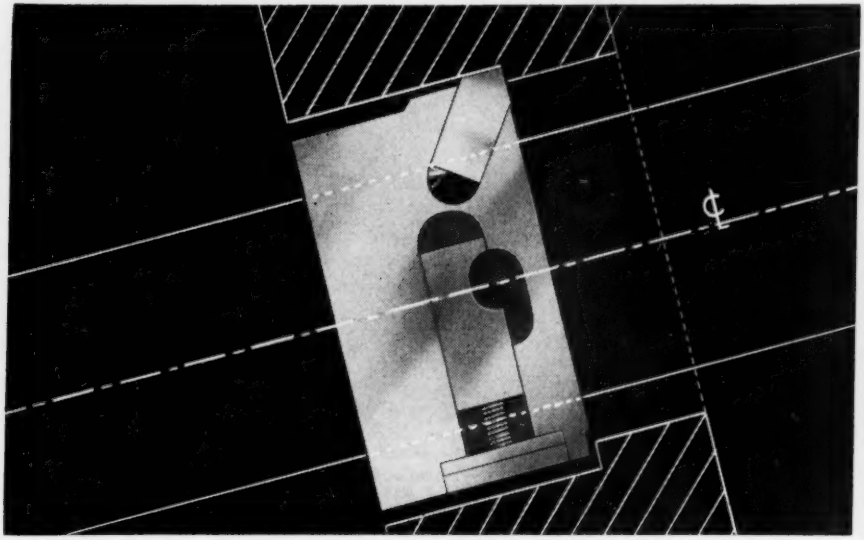
A combination manual and automatic control setup developed by Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich., permits the broaching of aircraft engine spiders, with complete support for the part being broached, on standard single-ram broaching machines. The machine shown is a Colonial 6-ton 54-inch stroke single-ram unit, which is arranged to broach six identical contours on the six arms of an aircraft spider.

In operation, the spider is placed in the fixture and clamped in place manually, locating from the splined hole. Each cutting stroke of the broach broaches the contours between one set of arms on the spider. When the circuit is actuated to start the broaching cycle, support jacks in the fixture automatically close in and support the two arms of the spider opposite the surfaces being broached. When the cut is completed, the fixture automatically shuttles clear of the broach and the automatic support jacks are released. This allows the operator—while the broach is returning—to manually unclamp the part and index it in the fixture to the next position for broaching the adjoining set of contours. Then, the cycle is repeated until all six contours between the six arms of the spider have been broached.

Power Steering Pumping Unit Rings Ground on Specially Adapted Disc Grinder

POWER steering for cars has become a practical reality and the

Get fast, positive line boring accuracy for 2½" to 17" dia. with . . .



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Made of high grade tool steel, hardened and ground, the blocks can be furnished with High Speed Steel, Cobalt, Stellite, Tungsten Carbide tipped or Tantalum Carbide tipped cutters.

For details, write for bulletin No. 602.

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GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WISCONSIN

Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car wheel boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.

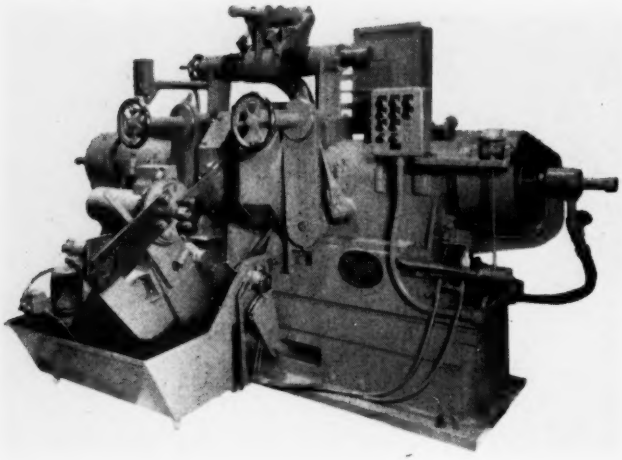
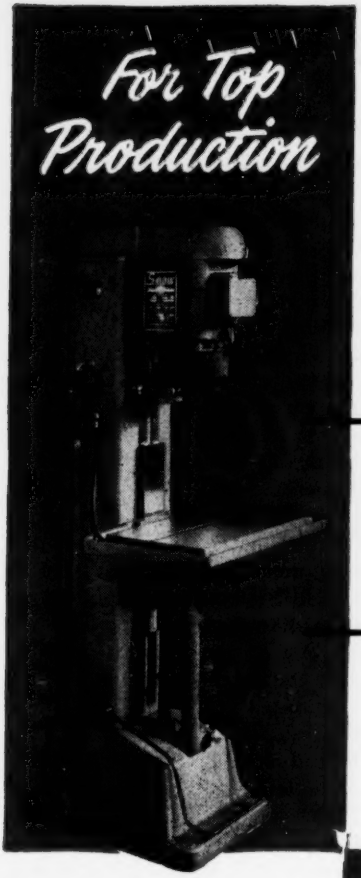


Fig. 1 — Besly Model No. 226 23-inch double-spindle wet grinder used to simultaneously grind the two parallel faces of cast iron rings for hydraulic pumping unit employed in power steering for cars

disc grinder shown in Fig. 1 is playing an important part in the production of the highly accurate hydraulic pumping unit. The two parallel faces of the cast iron pump rings are simultaneously ground to close tolerances for flatness, parallelism, and surface finish.

Manufactured by the Besly - Welles Corp., 108 Dearborn Ave., Beloit, Wis., the Model No. 226 23-inch double-spindle wet grinder illustrated operates semi-automatically to maintain high production rates. A single operation removes and loads pump rings at one arm of a work holder as shown in Fig. 2, while grinding is in progress at the other arm. During grinding, the work is automatically oscillated to increase the degree of flatness. Hydraulic feeding of the spindles and abrasive discs against the work is controlled automatically with a timed "spark-out" period to develop a high finish and accuracy. After grinding is completed, the fixture is automatically revolved with the new work indexed into position for the next grinding cycle.

The work-holding blades may be in-



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Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

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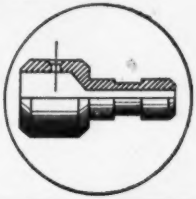
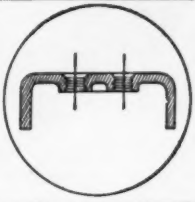


Crossdrill and C"T" Sink 1/16" Hole

Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

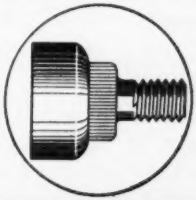
TAPPING



Tap Two #10-32 Holes

Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING



3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine

Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

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Fig. 2—Close-up view of work holder of disc grinder shown in Fig. 1.

terchanged to accommodate various workpieces, and the speed of oscillation is variable to suit conditions. Coolant is carried to the work through hollow spindles directly into the grinding zone. This arrangement ensures rapid dissipation of the heat generated, permitting precision grinding at high speeds.

Special Press Pierces Slots in Jet Engine Vane Rings

TO simplify the performance of piercing operations on heavy stainless steel rings, and at the same time facilitate loading and unloading of the heavy workpieces, the V & O Press Co., Division of Emhart Mfg. Co., Hudson, N. Y., has built and equipped a special 32-ton capacity horizontal power press which pierces 64 slots in 40 seconds in a jet engine vane ring for the airfoil blade. The fully automatic piercing operation is accomplished by two slides, adjustable to punch either outside-in or inside-out. The ring measures approximately ⅛ inch thick, 3½ inches high, and 32 inches in diameter. Loading and unloading are performed manually, bringing the total floor-to-floor time to 1½ minutes per piece.

The press is equipped with an air clutch and special indexing fixture, with complete electropneumatic control. Factors which influenced the adoption of the horizontal position included ease of loading and unloading and the problem of keeping the heavy piece in position during operation.

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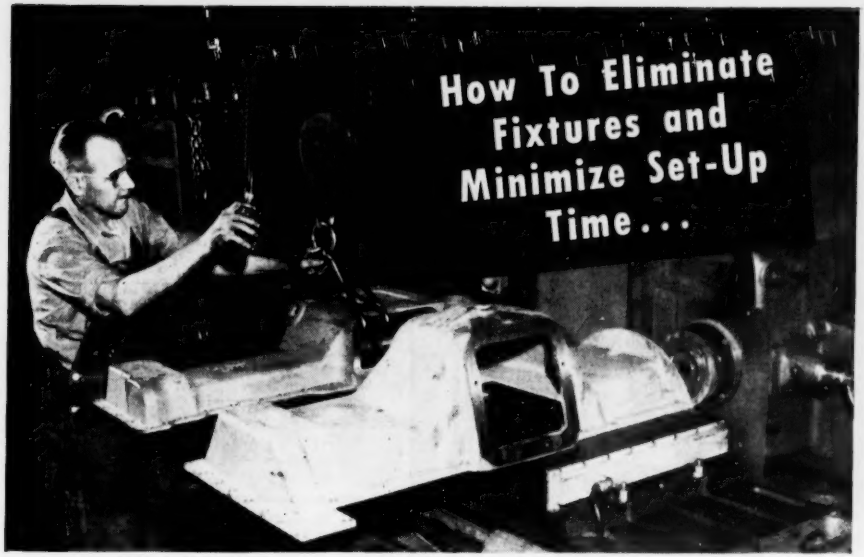

With Sundstrand Magnetic Chucks

Here's how Caterpillar Tractor Co. uses Sundstrand magnetic chucks to eliminate fixtures and cut down set-up time. A pair of chucks are used as a permanent set-up for milling the bell end flange on 26 different oil pans. Prior to installation of the Sundstrand chucks, their pans required 7 different fixtures and from ½ to 1½ hours set-up time. With magnetic chucks, a throw of a switch will secure or release either or both pans instantly. If you have milling or grinding operations in your plant it will pay you to investigate Sundstrand magnetic chucks.

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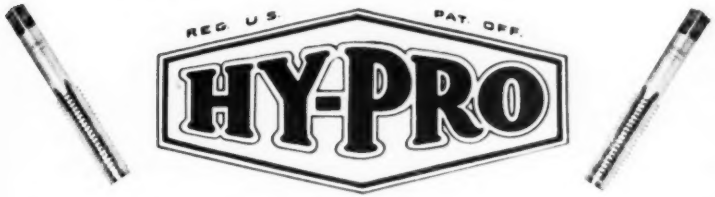

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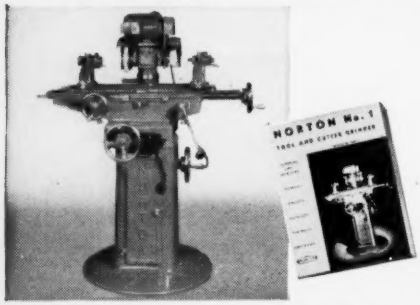
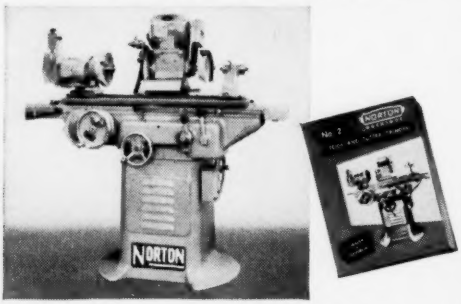


Norton No. 1 tool and cutter grinder. Supplied in arrangements varying from a plain machine for sharpening cutters and reamers supported on centers only, to a universal machine for cutter, surface, cylindrical and internal grinding. Especially valuable for circular form tool grinding because of micrometrical feed screw for traversing work table. Catalog No. 1034.



Norton No. 2 hydraulic tool and cutter grinder. Designed for the widest range of tool room jobs. An outstanding feature is the smooth, hydraulic table traverse, ideal for wet or dry cylindrical operations, internal jobs or the grinding of long reamers and cutters more uniformly and easily. Catalog No. 858.

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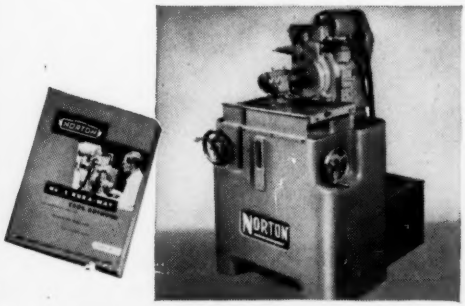
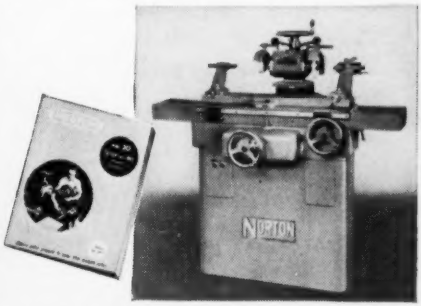


Norton No. 2 bura-way tool grinder. Provides the best method of grinding convex single point and form tools, because it generates, reproduces and maintains relief angles constant in the direction of the feed. Insures exact duplicates of the master tool form. Helps extend the life of carbide-tipped and other tools considerably. Catalog No. 220.



Norton No. 20 cutter and tool grinder. Easier to set up, operate and maintain, this versatile grinding machine handles many tool room jobs quickly and economically. The wheel head can be tilted up to 15° above or below horizontal and swivelled through 360°, simplifying ordinarily difficult applications. Catalog No. 189.

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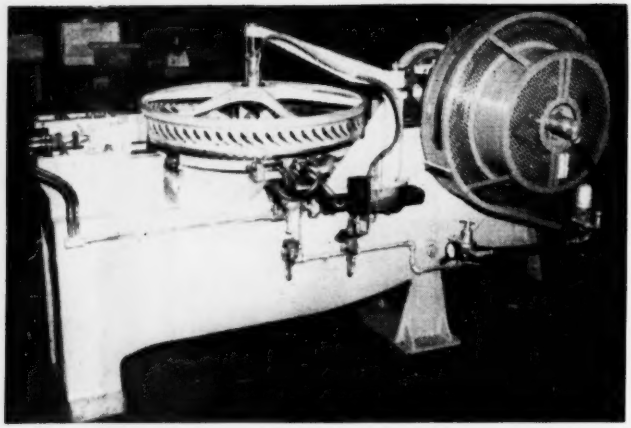

Special 32-ton capacity horizontal power press used to pierce 64 slots in 40 seconds in a jet engine vane ring for the airfoil blade. The stainless steel ring measures approximately ⅛ inch thick x 3½ inches high x 32 inches in diameter.

A simple operating sequence makes running the press easy. After placing the ring in position, the operator presses a button. From then until the piece is ready for removal, the operation is automatic. When the button is pressed, an air-operated hold-down swings into position and then moves down and clamps on the ring. When the hold-down reaches the "down" position, the press starts automatically. The press performs the exact number of strokes, controlled by a Cyclo-Monitor counter. After the last stroke, the press stops and the hold-down raises automatically and swings away. The finished vane is then ready for removal.

Special 56-Spindle Machine Back Spot-Faces Crankcase Holes

THE 56-spindle machine illustrated herewith, product of Moline Tool Co., Moline, Ill., back spot-faces two parallel lines of 25 holes each in the pan rail face and 6 holes in the accessory end of an aluminum crankcase

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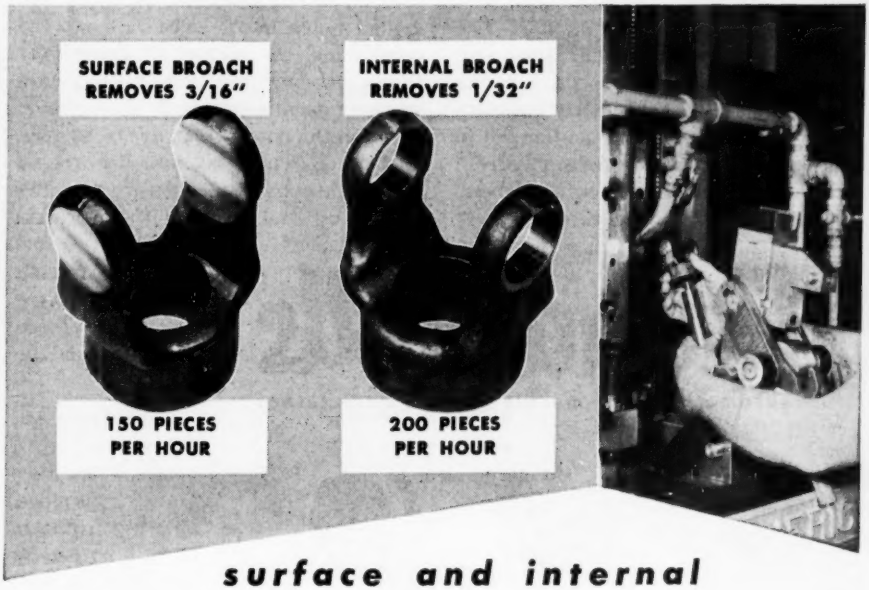
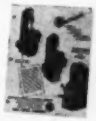


surface and internal broaching possible with *American* 3-way machine

To broach the lugs and cross holes of a universal joint, American engineers designed a combination tooling set-up on a standard American T-10-36 3-way machine.

Arranged with 3 stations, the machine surface broaches 3/16 stock off the inside and outside surfaces of the lugs at the center station; or broaches 1/32 off the I. D. of the lug cross holes at the two outer stations.

For more information on your particular broaching problem send a part-print or sample and hourly requirements. Address Dept. MM.



For more information on American Machines send for Catalog #300.

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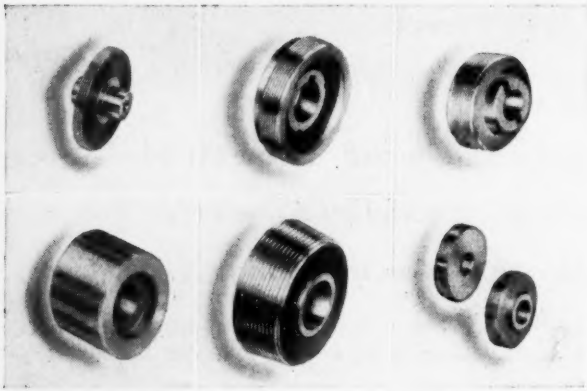
for internal combustion engines. The crankcase is set onto hardened and ground rest plates on the table of the machine where it is correctly positioned by locating pins and is clamped in place. The table is lowered by hydraulic power so that the 50 cutter drivers extend upward through the previously drilled holes in the pan rail. At the same time, the six cutter drivers for the accessory end are moved into working position so that they extend through the holes which are to be back spot-faced. These six spindles are on a separate hydraulic feed unit that moves up and down with the main table. The cutters, each having a bayonet-type lock, are placed manually on the drivers.

With all cutters in position and positive stops moved into place, spindle rotation is started by means of an electric push button and then the automatic hydraulic feed cycle is initiated in the same manner. The feed cycle includes adjustable timed dwell against the positive stops so that all of the spot-facing cuts will be of the correct depth.

Following the dwell, the reverse travel readily returns the work and the cutters to position where

Thread Rolls
on automatic screw machines and turret lathes



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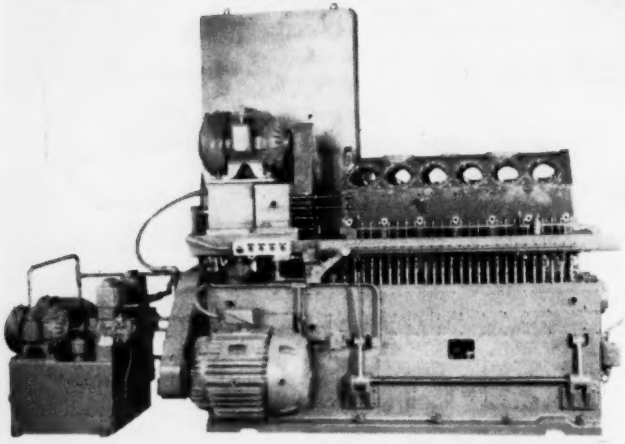

Special 56-spindle vertical and horizontal back spot-facing machine with semi-automatic hydraulic operating cycle for back spot-facing two lines of 25 holes each in the pan rail face and 6 holes in the accessory end of a "V" 12-cylinder engine crankcase. View shows crankcase clamped on work-holding fixture; spindle drive motors; hydraulic power unit; and removable positive stop mechanisms which are designed to control spot-facing depth.

the cutters are removed from the spindles prior to withdrawal of the cutter drivers and unloading the crankcase from the fixture.

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CUTTER GRINDING FIXTURE

RUGGED! RIGID! ACCURATE! LOW-COST UNIVERSAL CUTTER GRINDING FIXTURE

fits any universal tool or surface grinder. Here's the answer to your cutter and tool grinding problems.

PRECISION BALL END MILL grinding is done easily with this flexible and compact instrument, it grinds up to 2¼" dia., sets at any angle or radius with any cutting clearance on square, conical or ball nose shaped end mills.

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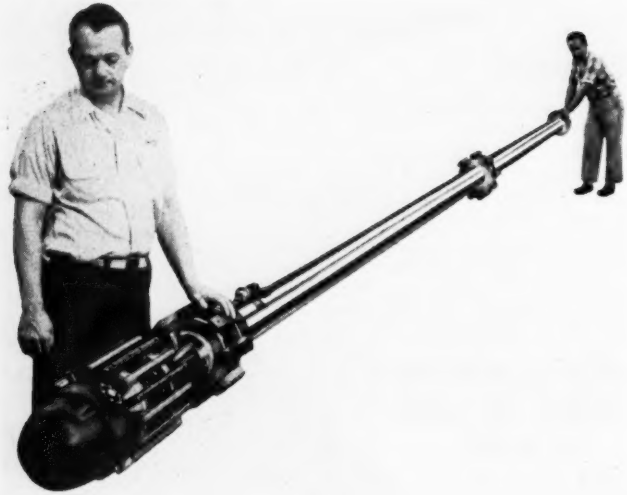

This 69-foot long tool was designed and built by Micromatic Hone Corporation for honing and testing the new 20 mm. atomic gun barrel.

New Tool Hones and Gages 280 MM. Atomic Gun Barrel

WITH the successful testing of the new 280 mm. atomic gun on the firing range, Micromatic Hone Corp., 8100 Schoolcraft, Detroit, Mich., has released details on its 69-foot long tool which is used to Microhone the bore of the gun barrel. The tool has a gage in its nose, making it possible to check the diameter of the bore at any point throughout its full length, without removing the tool from the bore, or the barrel from the machine. This new tool is reducing by 80 per cent the time the barrel is at the Microhoning machine.

After the barrel has been Microhoned to remove all rings, steps, and geometric inaccuracies resulting from previous operations, the diameter is checked in 30 seconds, by means of dials, at a conveniently located control station. The 33-foot long barrel can be checked completely, within 0.0003-inch tolerance, in just a few minutes; previously, large gun barrels of this type required a full day for the checking operation. The distance from the muzzle end to

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With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

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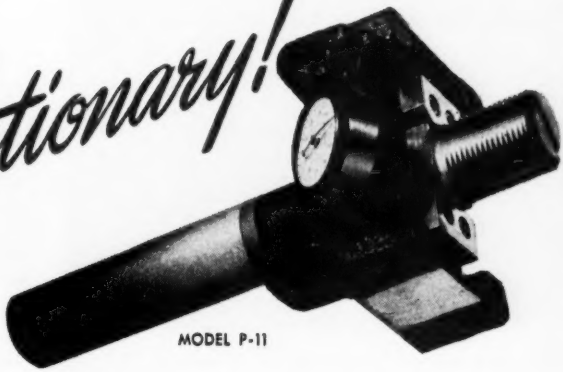

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The P-11 Internal Thread Gage gives one accumulated reading of P. D., form and lead. Variation of these elements from basic size is shown on the dial indicator which reads in .0005". Interchangeable pairs of segments inspect all classes of internal threads from 5/16" to 5" dia. The segments work on the principle of an expanding master plug. This 14 oz. portable gage is designed for use in the shop or at the inspection bench. Descriptive literature on this gage and other Bryant gages is available on request. Send coupon today.

Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.

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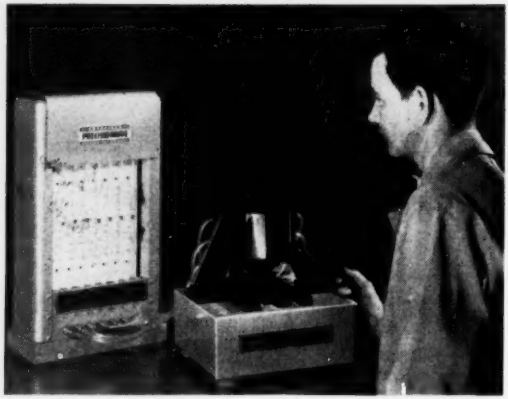


Operator demonstrates use of Sheffield Air Gage Assembly in checking critical dimensions on a jet engine turbine bucket blade.

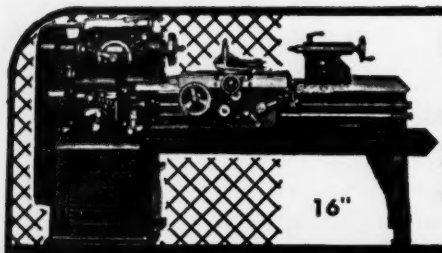
the point where the diameter is being checked is also readily indicated on dials.

Air Gage Assembly Developed for Checking Jet Engine Turbine Bucket Blades

AN air gage assembly that is used to check critical dimensions on a jet engine turbine bucket blade simultaneously is a recent development of The Sheffield Corp., Dayton 1, Ohio. In one quick step, an unskilled operator can check blade taper in relation to root form at three places along the leading and trailing edges and measure the length of the root form. The accuracy of each dimension is indicated by the position of floats in a seven-column "Precisionaire."

This multiple gaging assembly consists of a blade positioning fixture on which are arranged seven "Plunget" gaging cartridges, and a seven-column Precisionaire. The relative position between the Plunjet at the root form and those cartridges along one edge of the blade is always the same, since the gaging cartridges are positioned in a floating arm. Thus, a variation in root length, at long as it is within tolerance, does not prevent accurate inspection of taper.

Each Plunjet gaging cartridge has its own glass column and indicating float—a feature which shows instantly whether each dimension is accept-



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● This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

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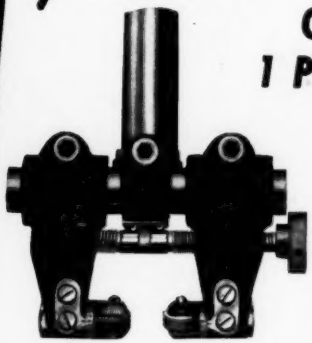

Diamond, Straight or Spiral knurled patterns cut on stock up to 2½" diameter. Knurls swivel to desired angle. Simple adjustment opens and closes holder arms for knurling recessed diameters. Fits turrets, tailstocks, and many automatic screw machines. Straight shank made to your specification up to 1¾". Knurls ¾" diameter, ⅜" face, ¼" hole. Specify 30, 20 or 12 pitch knurls.

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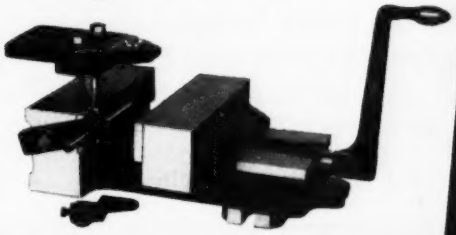

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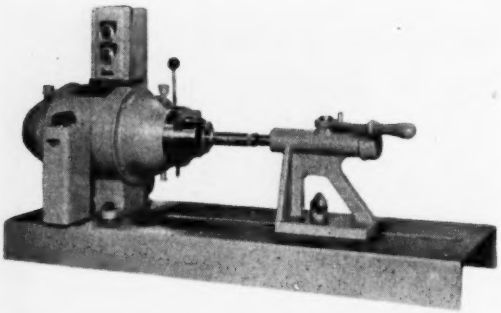

This bench model Schauer Speed Lathe is equipped with a special holding fixture for polishing small parts at high speed.

able or has a plus or minus condition. Close grouping of the columns and the upper and lower limit tolerance markers on the face of the glass tubes permit single-focus panoramic viewing of all float positions at one time. No expensive minimum or maximum precision masters are required since a calibrated product blade is used to position the floats.

Speed Lathe Is Specially Equipped for Overall Finishing of Small Parts

A bench model (Type NA1B) Schauer Speed Lathe, mounted on a steel bed plate equipped with a tailstock, provides a fast, economical method for polishing the overall external surfaces of small metal or plastic parts. Built by Schauer Mfg. Co., 4500 Alpine Ave., Cincinnati 36, Ohio, the speed lathe illustrated is equipped with a special holding fixture. Operation of the motor and spindle brake is controlled by a hand lever, while the tailstock lever permits rapid loading and unloading of the work.

Such additional equipment as cut-off devices, compound rests, turrets, tool post grinders, and so on, can be mounted on the bench or bench lathe bed for secondary finishing work.

New Design of Indexing Machine for Jet Engine Part Drilling and Tapping

JET engine parts which require drilling, tapping, reaming, chamfering,

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COSTLY SLIPPING ACCIDENTS

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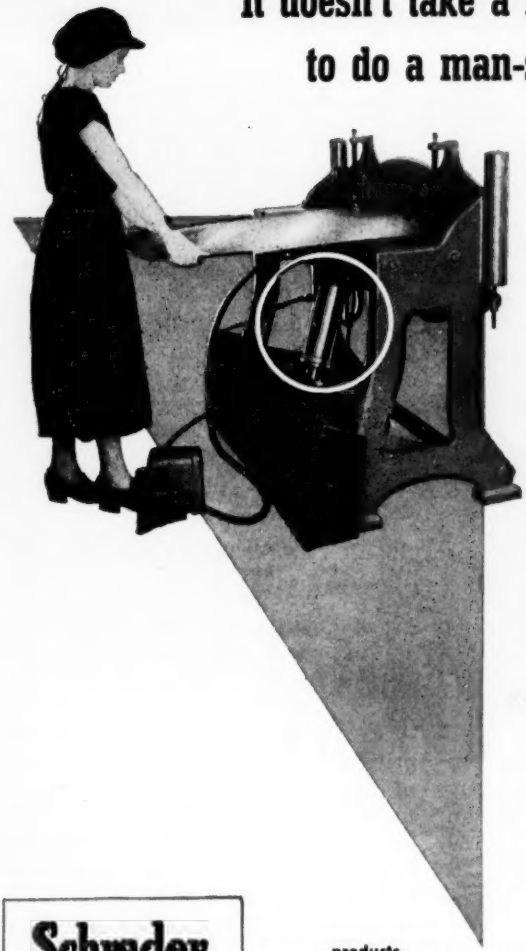

Before these shears were shifted to air operation the entire weight of a man was required on the foot treadle to cut the sheet metal.

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SPECIAL TOOLS FOR MORE PRODUCTION

This Electrodex Index Table was developed by The Avey Drilling Machine Company to provide a more accurate and efficient method for machining jet engine parts.

counterboring, or light milling can now be more accurately and efficiently machined by means of a new design of indexing machine developed by The Avey Drilling Machine Co., Cincinnati 1, Ohio. Featured by this machine is a new development known as the "Electrodex" index table which provides the following outstanding advantages: (1) non-accumulative tolerance of 0.001 inch maximum between adjacent holes at a diameter of 30 inches; (2) number of indexes produced by the table may be readily varied by means of a very simple interchange of one template with another; (3) by means of a very simple manual or automatic adjustment, two or more series of indexes, varying in number of holes, may be produced in a workpiece without disturbing the location of the part; (4) irregular series of holes (having no common factor) may as easily be produced as regularly spaced hole series; and (5) normal (or even excessive) wear of the driv-

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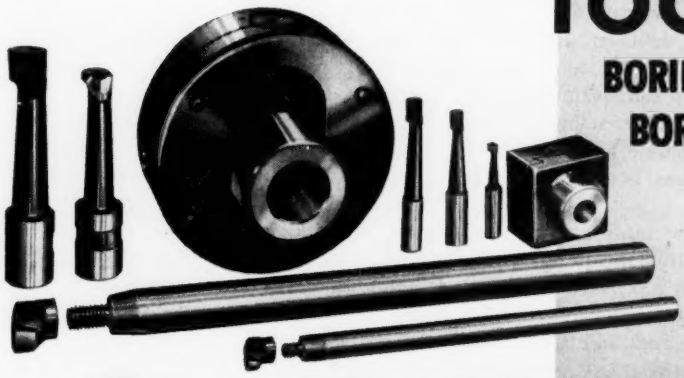

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Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

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These tools will cut your boring costs.
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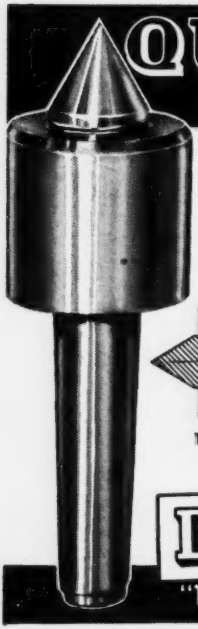
ing pinion and gear has no effect on accuracy of indexed position.

The Electrodex is available with standard 30, 36, or 40-inch diameter table tops. The work-holding fixture may be attached directly to this stress relieved gray iron casting or to a steel sub-plate which is then attached to the table top. The standard index range is from 2 to 100 stations. Irregular indexes of any spacing are permissible so long as a minimum spacing of 3.6 degrees is maintained between stations.

The Electrodex table shown in the accompanying illustration is indexed by means of a ½ h.p., standard stock, d.c. motor which is operated by a 3-phase, full-wave rectified transformer supply. The table may be indexed rapidly in reverse direction through the use of a jog reverse control. Index time per station is approximately three seconds. The panel controlling equipment is composed of standard machine tool control components, conforming to N.E.M.A. standards.

The drilling operation, as shown in the accompanying illustration, is performed with an Avey No. 1 cam feed drilling unit. Sideways adjustment of the drilling unit is provided to accommodate jet rotor wheels having various angle slots.

Since the machine is operated automatically, an air-operated hole detector has been provided to register an alarm when a drill is broken.



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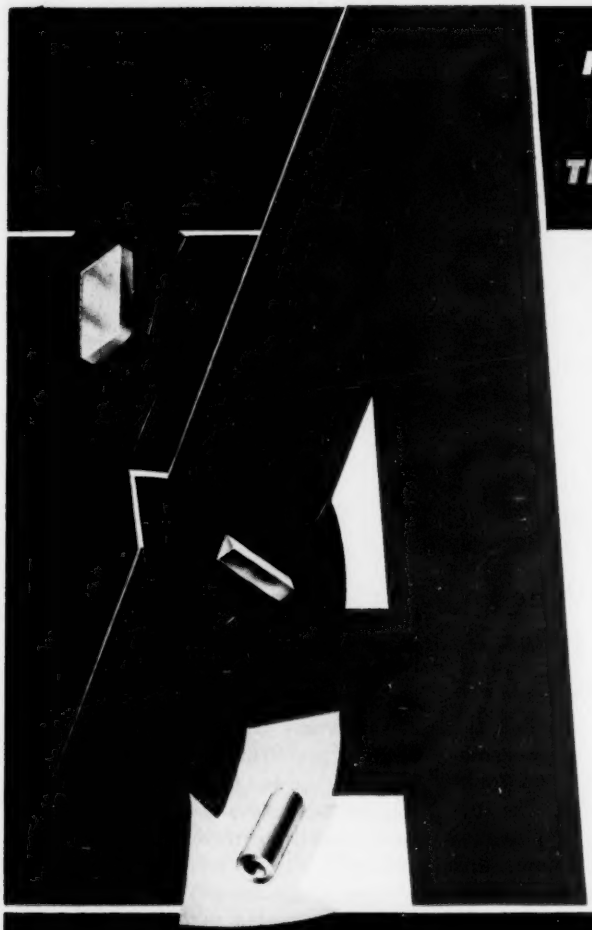

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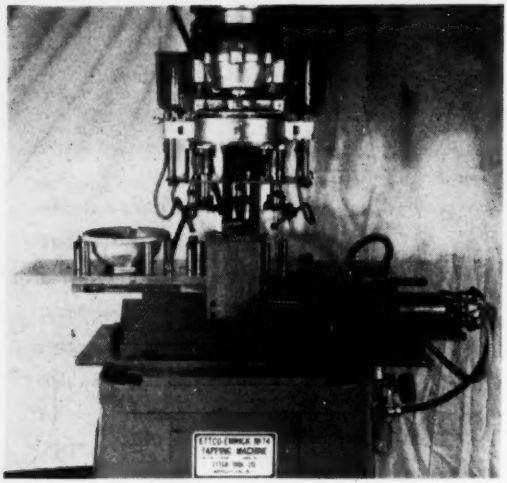

This machine was specially built by Ettco Tool Co., Inc., for simultaneously tapping three holes on different center distances in lamps.

Specially Built Machine for Tapping Three Holes Simultaneously

FOR a particular job involving the tapping of three holes simultaneously, Ettco Tool Co., Inc., 594 Johnson Ave., Brooklyn 27, N. Y., has specially built a three-spindle tapping machine consisting of a base, column, and automatically air-operated head which is controlled to close limits electrically. The design also includes a reversing unit to supply the forward and reversing motion necessary to tap three holes; a standard three-spindle adjustable head with floating tap chucks to correctly locate and hold the taps; and a standard shuttle type fixture having a table that is movable from left to right, or the reverse, and is air operated and electrically controlled.

Work locating pins, as shown in the accompanying illustration, are used to locate and hold the parts. The work is merely placed into the nests and a foot or hand-operated switch pressed. The cycle is as follows: The movable table travels either left or right and brings the part under the taps. At the end of its stroke, an electric contact is made and the 3-spindle head travels downward, taps the work, automatically reverses, and comes to a stop in its up position. While the tapping is taking place, the open station is unloaded and a new part is put

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TAPS

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in its place, ready for the operation to be repeated and the part tapped. The total time is about four seconds a piece. As the up and down movement of the 3-spindle head and the movement of the table on the shuttle fixture are air operated and electrically controlled, it is quite easy to interlock their movement.

Since two different lamps having different center distances of the three holes were to be tapped with this machine, two templates were supplied to correctly locate and hold the three spindles in position. As the parts were different in size and shape, it was necessary to make the work locating pins movable. This was quite simple as they are tapped into the movable table. The practice is to tap all the parts of one size and then change the three spindles and locating pins to conform to the requirements of the second part. This change-over takes about 15 minutes.

Since the parts that make up this special machine are all standard stock items, it is simple to rebuild and relocate the work-holding means and the spindles to the requirements of the different part if necessary.

LET'S TALK FACTS ABOUT FACE MILLS!
"This NELCO solid-brazed, carbide tipped mill is the best tool we've got. We get the most for our money — it's solid, rugged and dependable . . . gives better finishes, higher table feeds and turns out more work between grinds. Boy! It's a Honey!"
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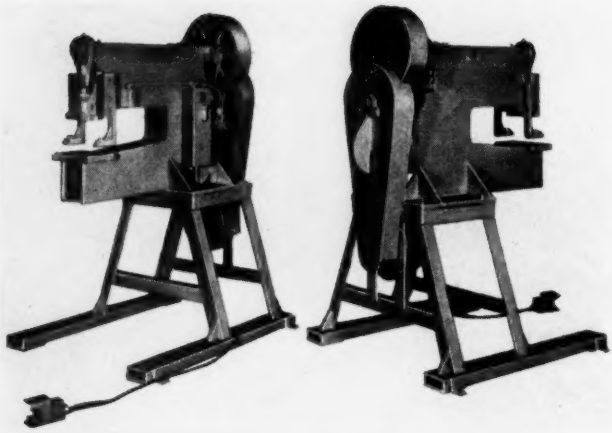
For that Extra Edge in Production
NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

Work-handling consumes more time than work-cutting in producing many jobs. Reducing manual effort by one-half may increase production more than by faster cutting speeds. To make this improvement without burdening the operator — in fact to make it easier for him—is the chief advantage of the new Sibley Model ME-25. The variable speed drive, the big 21½" swing, the extra large table, the convenient speed controls, the handy tachometers, all combine to make this 1" capacity, medium weight machine a production advantage in any shop!

SIBLEY

MACHINE & FOUNDRY CORP.
SOUTH BEND 23, INDIANA

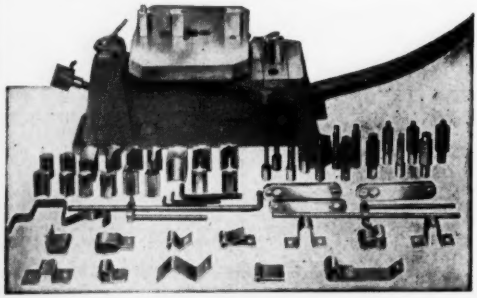


This illustration shows a front and rear view of a special horn type punching machine developed by Whitney Metal Tool Company from a standard power punch press to meet the specific needs of a customer.

Special Horn Type Punching Machine Is Made from Standard Power Punch Press

A COMPARATIVELY simple redesign of the supporting structure has changed a standard power punch press into a "horn" type of punching machine. Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill., altered the base arrangement for one of its No. 230 power punch presses to meet the specific needs of a particular customer.

The problem was to provide a means for performing a variety of punching operations in the walls of various steel cylinders and drums. Some of these pieces were several feet in length so that an extension foot-control switch was added to permit the operator to trip the machine while handling the work from the outer end. The work, of course, slips over the lower die support or "horn." The customer made up his own fixtures and his own punch and die adapters. A "pancake" type motor is used for compactness and adaptability; also, a reinforced outboard bearing support for the flywheel.



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AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

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Your Bunting Distributor is an industrial distributor or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. He carries in stock, for your money saving convenience, completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars in a complete range of sizes meeting all your usual production and maintenance needs. Ask him for catalog.

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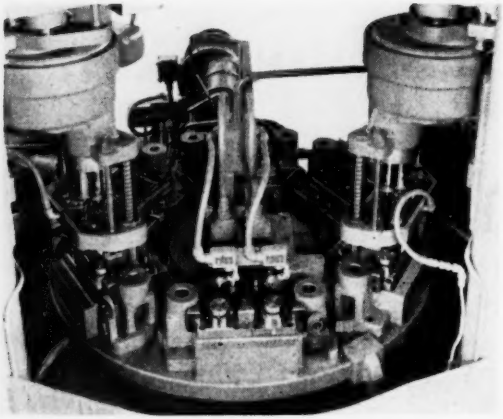


Close-up view of Turner special automat c 6-station indexing-type machine showing the dead-center index.ng table and fixture clamping mechanism

Special Automatic Indexing Machine for Producing Steering Gear Pistons

A SPECIAL automatic 6-station indexing-type machine which is said to be capable of drilling, reaming, milling, and countersinking steering gear pistons at the rate of 440 per hour at 100 per cent efficiency has been developed by Turner Brothers, Inc., 2625 Hilton Rd., Ferndale, Mich., which states that specially designed fixtures and multiple spindle heads account for the high production rate.

An unusual feature of the fixture and clamping mechanism is the dead-center indexing table mounting a stationary cam track. Rollers, attached to the fixture clamping mechanism, pass through as the table indexes from station to station. Limit switches, also attached to the center, prevent the machine from being operated unless the parts are clamped in place. The multiple spindle drill heads have guide pins which enter bushings in the fixtures before the actual machining operation takes place, thus ensuring high machining accuracy.

Automation Boosts Production of Shoulder Gears to 240 Per Hour

EVEN a 6.250-inch flange does not slow up production of automotive

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

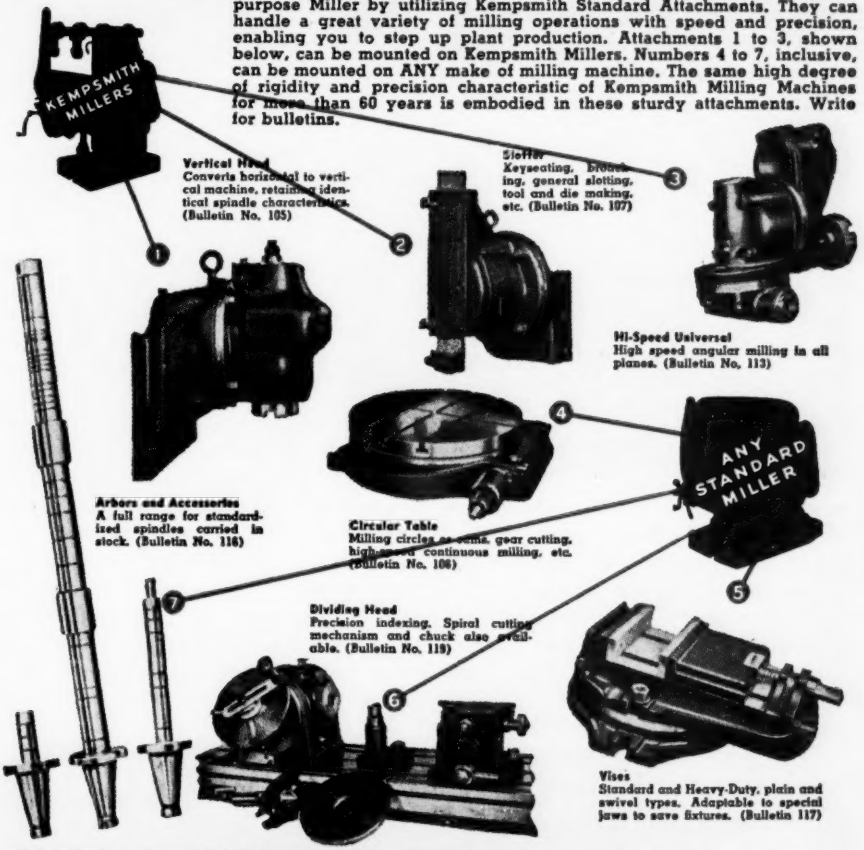
Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

HEIMANN MFG., CO. ● URBANA, OHIO

Milling Machine Attachments that [illegible] PRODUCTION

You can easily convert your general duty Milling Machine to a special purpose Miller by utilizing Kempsmith Standard Attachments. They can handle a great variety of milling operations with speed and precision, enabling you to step up plant production. Attachments 1 to 3, shown below, can be mounted on Kempsmith Millers. Numbers 4 to 7, inclusive, can be mounted on ANY make of milling machine. The same high degree of rigidity and precision characteristic of Kempsmith Milling Machines for more than 60 years is embodied in these sturdy attachments. Write for bulletins.



Vertical Head
Converts horizontal to vertical machine, retaining identical spindle characteristics. (Bulletin No. 105)

Slotter
Keyseating, broaching, general slotting, tool and die making, etc. (Bulletin No. 107)

Hi-Speed Universal
High speed angular milling in all planes. (Bulletin No. 113)

Arbors and Accessories
A full range for standardized spindles carried in stock. (Bulletin No. 116)

Circular Table
Milling circles or cams, gear cutting, high speed continuous milling, etc. (Bulletin No. 108)

Dividing Head
Precision indexing. Spiral cutting mechanism and chuck also available. (Bulletin No. 119)

Vises
Standard and Heavy-Duty, plain and swivel types. Adaptable to special jaws to save fixtures. (Bulletin 117)

THE KEMPSMITH MACHINE CO., MILWAUKEE 14, WISCONSIN, U. S. A.

KEMPSMITH

• Precision Built Milling Machines Since 1888 •

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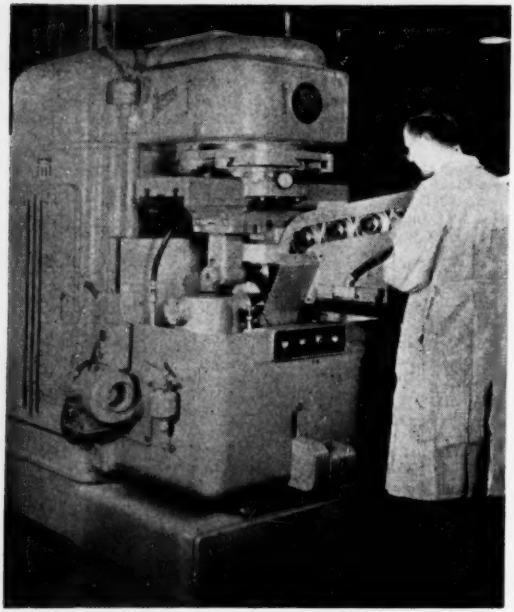
SPECIAL TOOLS FOR MORE PRODUCTION



Operator loads hopper of "Underpass" Gear Finisher with shoulder gears. From this point on all steps, including preinspection and rejection of over-sized gears, are automatic.

shoulder gears on an automation equipped "Underpass" gear shaver. One shaved helical shoulder gear every 15 seconds is the pace maintained by this conveyorized set up with fully automatic operation. The basic machine is a Model 870 "Underpass" gear shaver built by Michigan Tool Co., Detroit, tooled up for fully automatic operation. All the operator has to do is load the hopper; the rest of the cycle, including preinspection of gears, is automatic. A sizing fixture at the hopper mouth rejects oversize gears, thus providing automatic quality control through the operation.

Gears move down a trough by gravity until they reach loading position. Here an air cylinder takes over and feeds the gears into shaving position, one at a time. The shoulder of the incoming gear pushes against the shoulder of the shaved gear, causing the latter to eject at the completion of the shaving cycle. The gear teeth themselves never touch, thereby eliminating any possibility of damage to the finished gear. An air-operated expanding

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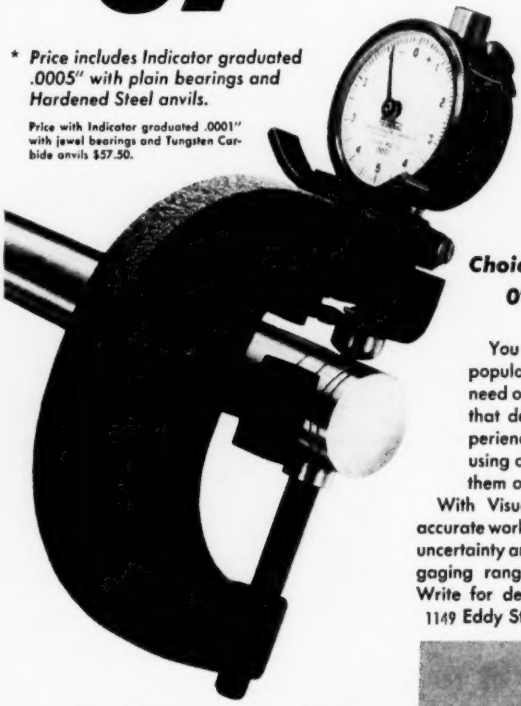
$37.50* buys this Indicating SNAP GAGE

* *Price includes Indicator graduated .0005" with plain bearings and Hardened Steel anvils.*

Price with Indicator graduated .0001" with jewel bearings and Tungsten Carbide anvils $57.50.



Choice of 3 capacities:
0" to 1", ¾"to 2", 1¾"to 3¼"

You can't afford to be without the most popular modern Indicating Snap Gage. No need of hanging onto antiquated snap gages that depend on blind, uncertain "feel". Experience proves you aren't saving money using old style gages just because you've got them on hand.

With Visual Indicating Gages you get more accurate work with less scrap. They relieve operator uncertainty and frustration. And, they cover a wider gaging range. Larger sizes are available, too. Write for details. Federal Products Corporation, 1149 Eddy Street, Providence 1, R. I.

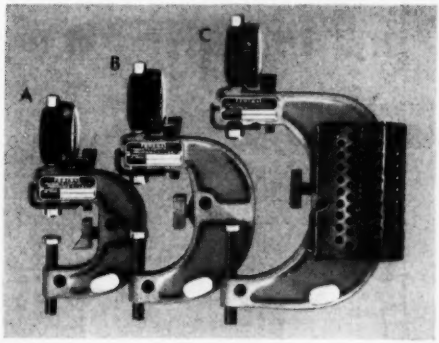
Set of 3 Gages covers all sizes from 0" to 3¼"—replaces rackfuls of old style gages.

A Model 1000P-1 A
Capacity 0" to 1"

B Model 1000P-2 A
Capacity ¾" to 2"

C Model 1000P-3 A
Capacity 1¾" to 3¼"

Larger sizes available.



FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES

mandrel clamps the incoming gear and holds it during shaving. A safety device is provided for automatically ejecting any gear not properly aligned with the cutters. Release at the end of the machine cycle is automatic. The 27-tooth helical gears have a 2.0257-inch pitch diameter with a 0.734-inch face width. Normal pressure angle is 18 degrees 30 minutes with a 17-degree 49-minute 6-second left-hand helix angle.

The ejected gear rolls down a trough at the back of the machine and lays over gently, flange down, on a wire mesh conveyor used to transfer the gear to the next operation. A short guide rail extending beyond the end of the exit trough and the weight of the flange combine to position each gear accurately on the conveyor. The completed gears move down the length of the wire mesh conveyor and empty onto a parts table to complete the operation.

Bar Feed Applicable to a Variety of Operations

SINCE 1949, Lipe-Rollway Corp., Syracuse 1, N. Y., has manufactured Automatic Magazine Loading (AML) pneumatic bar feeds that eli-

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That's why they're fast, accurate, so adaptable, so easy to operate. Why maintenance is simple. Why initial cost is low . . . Often considerable savings and improved punch press operations are possible if you let our engineering staff assist you. There is no obligation. Simply furnish the details relating to your need or problem and if possible send samples or drawings of the work. You will hear from us promptly.

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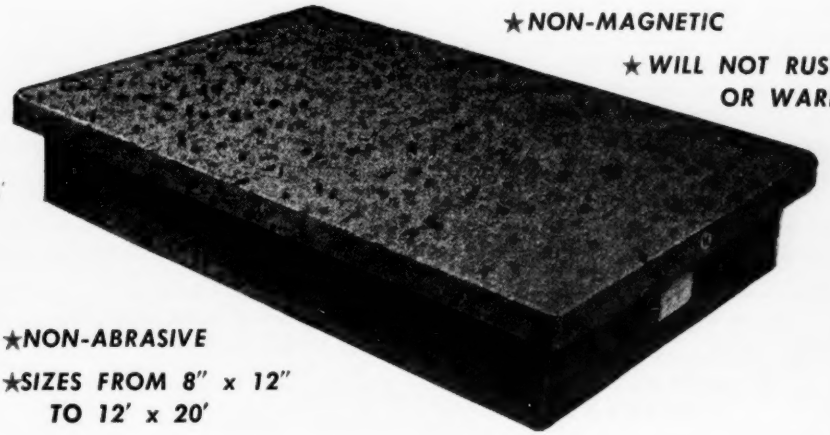
★*NON-MAGNETIC*

★*WILL NOT RUST OR WARP*



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★*SIZES FROM 8" x 12" TO 12' x 20'*

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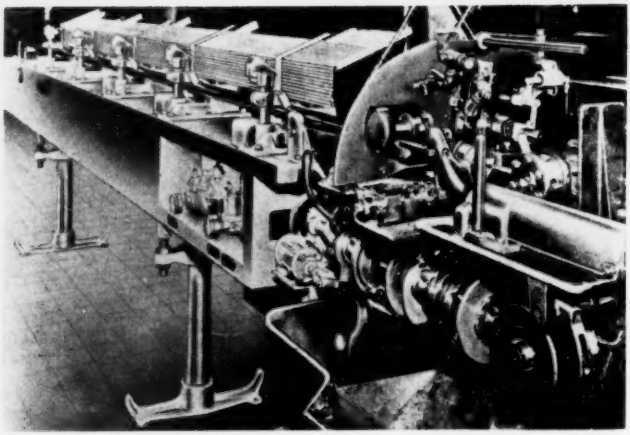
SPECIAL TOOLS FOR MORE PRODUCTION



The Lipe Automatic Magazine Loading Bar Feed, which is actuated by air valves and cylinders, is applicable to automatic screw machines, abrasive saws, cut-off machines, punch presses, and centerless grinders.

minate frequent loadings by hand, feed bar stock continuously for periods up to eight hours or more, and increase production output of Brown & Sharpe automatic screw machines at least 50 per cent. Operators are left free to devote more attention to the tooling, machine operation, inspection, minor repairs, and preventative maintenance of a greater number of machines. Moreover, although usual practice calls for one man to operate three to four automatic screw machines, the Lipe AML bar feed's efficiency allows one operator to handle up to ten machines. In addition to most types of single spindle automatic screw machines, the Lipe AML bar feed is also applicable to abrasive saws, cut-off machines, punch presses, and centerless grinders.

The Lipe AML bar feed, which only requires 5 to 10 minutes' set-up time, does not increase the overall time for change of setup on the automatic screw machine. Therefore, long and short production runs are just as easy and efficient to handle, and all runs are operated without using feed fingers on the automatic screw machine.

The Lipe AML bar feed's main purpose is to increase production. Simple to operate, the Lipe AML bar feed is

"NIROL" NEEDLE BEARING SPRING LOADED LIVE CENTER

"NIROL"

Trade Mark Reg. U. S. Pat. Off.

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• COMPACT
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The most compact and rugged live center for its size. Minimum overhang adds to rigidity and machine capacity. Complete range of sizes.

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NIROL MFG. CO.

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He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.

PUT THE LIGN-O-MATIC TURRET IN YOUR SHOP FOR A FREE 10-DAY TRIAL . . . IT WILL . . .

INCREASE PRODUCTION — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

CUT COSTS — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic reduces tool and jig wear, cuts worker fatigue: adds up to faster work with fewer rejects. All parts completely guaranteed for TWO YEARS against defective manufacture.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper $235.00

DELIVERY — Currently, 2 weeks.

TRY IT YOURSELF at our expense. If you are not fully satisfied for *any* reason, return turret within 10 days and pay nothing.

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☐ Please rush ..... Lign-o-matic turrets for (drill press make) ..... (size) ..... (quill dia.) ..... (spindle taper) .....

☐ Please send bulletin with complete information.

MY NAME _____

TITLE _____

(Attach coupon to company letterhead)

actuated by air valves and cylinders. Bar stock is racked in a magazine along one side of a split stock bar tube, the lower half of which slides backward to receive the bottom bar stock from the magazine. Then, the lower half of the stock bar tube, carrying the bar, moves forward to close the stock bar tube. A stock pusher, inside this tube, moves the bar into the spindle and collet of the automatic screw machine. Regardless of model, the magazine capacity of stock bars 12 feet long or less is from nineteen $\frac{5}{8}$-inch diameter bars to ninety-six $\frac{1}{8}$-inch diameter bars. It is from this point—after the bar feed is fully loaded and ready to feed the stock bars into the automatic screw machine—that a series of mechanical operations takes place that accounts for its fully automatic operation.

As the Lipe AML bar feed feeds the entire stock bar through the automatic screw machine spindle and collet to the last workpiece, its operator can practically ignore attention to the Lipe AML bar feed's action. Moreover, since the Lipe AML bar feed automatically ejects the end remnant of the stock bar being machined without the operator's attention, the end remnant is positioned by the stock pusher in the collet so that the next new

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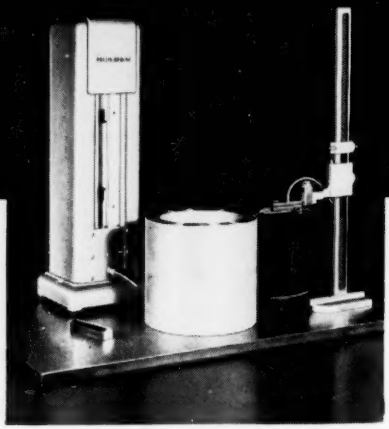

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You can lengthen the life of your metal-working tools. You can increase machine feeds and speeds, and save steps in production. All you have to do is dissipate heat faster than usual.

Water is the fastest cooling agent known. By conditioning water with Lusol all-chemical solution, we make water suitable as a metal-working coolant. It contains no oil. Yet, actual production increases credited to Lusol range from 50% to 500%.

Tools work cooler under Lusol, and stay sharp longer, because Lusol dissipates heat so fast. This allows you to boost machine output and get more efficiency per unit. Since there's no oil in Lusol, it won't smoke even at breakneck machine speeds.

But Lusol is more than a coolant. Its chemical make-up includes: (1) Detergents for cleaner machines and machining; (2) Lubricants (not oils) with higher film strength than oil coolants; (3) Rust preventives to counter oxidation; (4) Germicides to prevent skin irritations (workers even wash their hands in it). Every ingredient performs a service and contributes to greater machining efficiency.

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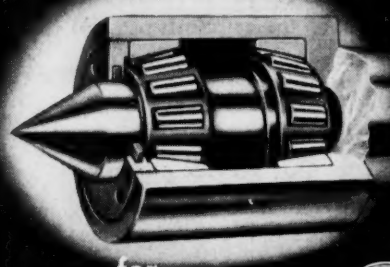
stock bar ejects the remnant automatically. Then, the stock pusher positions the new bar for the first cut-off operation with minimum waste.

Probably the most important operation of the entire feed cycle takes place when the stock bar in the machine collet is used up to the end remnant; the machine clutch disengages automatically and the machine tool cycle stops with the spindle revolving and the collet open. When the automatic screw machine clutch disengagement stops the machine's indexing cycle, the Lipe AML bar stock pusher is retracted. Here again, by releasing one stock bar from the magazine and by dropping it into the lower half of the stock bar tube, a new stock bar is loaded. Immediately the bar feed stock pusher feeds a new bar through the collet, and ejects the end remnant.

Immediately after the new stock bar is positioned for the first cut-off operation, the automatic screw machine clutch is automatically engaged, the collet grips the stock bar and the automatic screw machine is in full cycle operation again. The new stock bar has been fed out by the stock pusher just far enough for the cut-off tool to square the bar with a minimum waste of stock. Then, the indexing operating cycles are continued until the stock bar is used up completely.

Because different runs require different length workpieces, accurate length measurements are important. In a single feed-out operation using a standard second-operation clutch on the automatic screw machine, the feed-out length of the stock bar may be any length—without rebound of the stock bar from the stop.

...accurate beyond comparison
Falls ROTO CENTER



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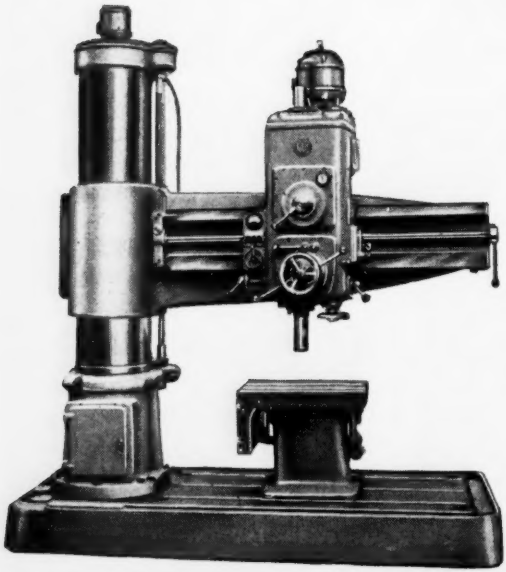

For greater efficiency, 36 speeds and 12 feeds can be pre-selected on this HKH Kolb Radial equipped with electro-hydraulic pre-selectors.

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- Hardened and ground spline shafts rotating on ball bearings

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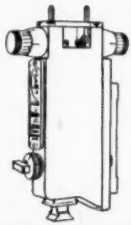
One machine is accurately checking 8 dimensions simultaneously—separating correct, oversize, and undersize parts at a rate of 2100 an hour.

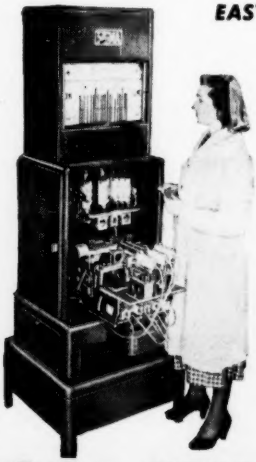
Two girls now handle an inspection job that formerly took six—and human errors have been eliminated.

Eight, standard Sigma gauges, like this one: have been mounted together for rapid, accurate inspection of mass produced parts. Each gauge, accurate to within .00005", measures one dimension. More (up to 30) or fewer gauges could have been used, depending on the number of dimensions to be checked. These gauges, with standard Sigma mounting units, and special fixtures where necessary, can be set up to inspect parts a fraction of an inch long, or several inches long, a foot, or longer.

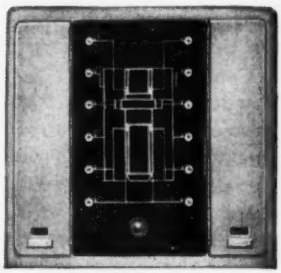


Depending on the arrangement, they can check internal and external diameters, length, depth, or other characteristics. The type of parts and the method of feeding determine inspection rates—hand feed: up to 600/hr.; semi-automatic: up to 900/hr.; fully automatic: up to 3500/hr. or more. Gauges are quickly and easily set to required tolerances and change-over from inspecting one type of part to another can be done within 10 or 20 minutes.

EASY-TO-READ INDICATORS WITH SIGMA EQUIPMENT



The semi-automatic Turbine and Compressor Blade Inspector (left) is an excellent example of Sigma's solution for a difficult inspection problem involving 18 dimensions. Fixtures are replaceable—each machine can inspect a wide range of different type parts. Gauges are connected to a Liquicolumn Indicator which has tubes of colored liquid set beside graduated scales—liquid levels indicate actual sizes of dimensions being checked. Magnifications can be varied easily by the user. Alternate indicator (right) uses electrical signals—green light for acceptable parts, red lights indicate dimensions below tolerances, yellow lights for those over. Built-in counters tabulate the number of parts submitted for inspection and the number accepted.



Contact us and get details on the Sigma equipment best suited to your high speed, multi-dimensional inspection problems.

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IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

Carboloy Celebrates Twenty-Fifth Anniversary

WHEN cemented tungsten carbide entered the American industrial scene, it was like a diamond in the rough. The glitter was there—but its sparkle was elusive.

To further develop and bring this new German-discovered metal, originally called Widia. to bear on American production, to exploit and realize the advantages of its diamond-like hardness was a struggle that began in 1928 — one that kept the company organized to develop and market it 12 years in the red — one that changed machining techniques in American fabricating plants and placed new emphasis on mass production methods.

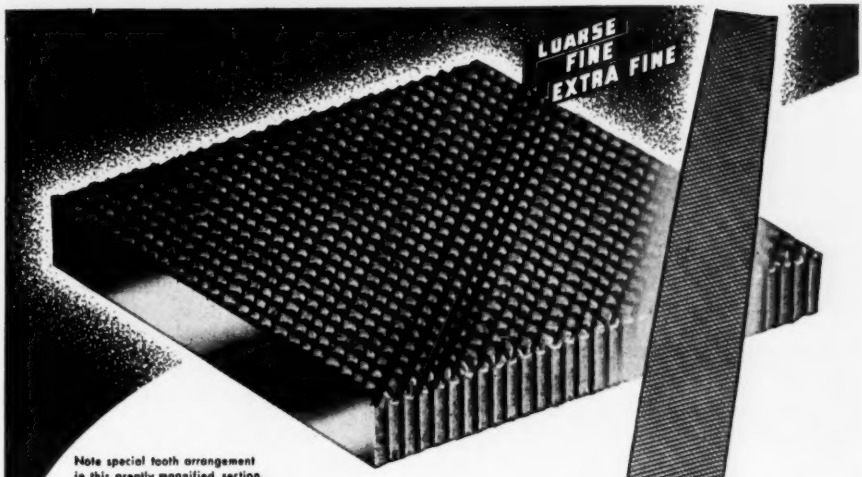
FAMILIAR to everyone engaged in metalworking operations are many examples of outstanding production jobs accomplished through the use of cemented carbides. Less familiar, however, is most everyone with the long years of costly and painstaking development work that lies behind the perfected tools in use today. As MODERN MACHINE SHOP celebrates its own 25th anniversary, it takes this opportunity to pay a well-earned tribute to Carboloy — pioneer in the development of cemented carbides who this year also celebrates its first quarter-century in business — by publishing the accompanying historical account of the company.—*Editor's Note.*

Cemented carbide is a product of powder metallurgy. Developed in Europe as a super-hard material to draw fine wire, it caught the attention of metallurgists in the General Electric Research Laboratory prior to 1928. By that year, researchers were convinced that the metal that came from overseas in chunks had unusual possibilities as a cutting tool.

But acceptance of the imported material at that time was practically nil. Fired by its possibilities, production men gave the material every chance as a cutting tool, but it wouldn't do the job. The smallest chunk available was 2 inches in length and it couldn't be cut. As solid tools they cracked, or broke off in the middle of a cut. Although very hard, they could not resist impact. Machine speeds were too slow and machine tools couldn't take it when speeds doubled and tripled.

Thus with the forming of Carboloy Co., Inc., by General Electric in 1928, the first decision was to abandon tools of solid carbide and concentrate on tipped tools. Tips to do the cutting but steel shanks to take the bending and shock stresses involved in machining operations.

In 1929, thousands of the new type tools were produced and shipped out on trial. Then almost abruptly they started returning—and were junked by the thousand. "Cannot be used like high speed steel tools" was the report from the field. To make matters worse, it was found that the tools were worth-



Note special tooth arrangement in this greatly magnified section.

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NUCUT look for the white tang

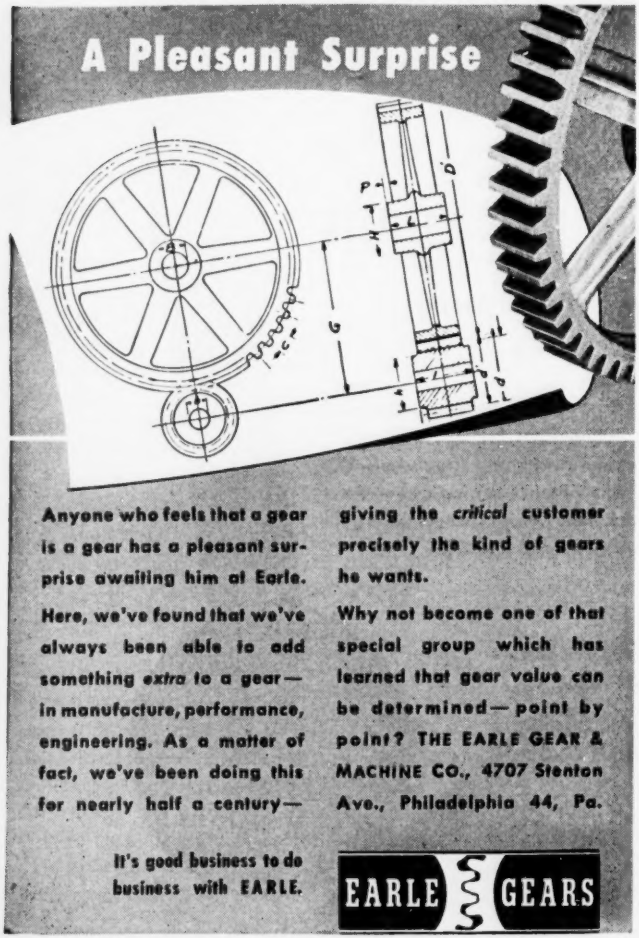
less without special grinding wheels. Trouble cropped up in manufacturing the metal, and in brazing the tips to the shanks.

The first ray of hope for the tools broke in 1930. A new molding process was developed that would permit the production of drawing dies for round and shaped work. Next a machine to saw the carbide tips was perfected. This shortened manufacturing time.

By the end of 1930, a large automotive manufacturer decided to give the new material a trial and began to use it in appreciable amounts. An aircraft manufacturer jumped on the bandwagon. The following year 25 experimental grades of carbide were produced. But 23 of these were discarded. One grade for steel cutting provided another ray of hope. Initial field tests justified further tests in production. But its success proved short-lived and it became necessary to scrap $20,000 worth of tools.

By the end of that year things began to happen fast. A carbide tipped broach produced 1,000,000 pieces before requiring regrinding; a tool steel was found that eliminated shank breakage; a second large auto producer began to use carbides extensively; a wire mill reported a reduction in scrap by 98 per cent in using cemented carbide dies.

Before the end of 1932, Carboloy Co. had solved two tough problems in the automotive industry—the machin-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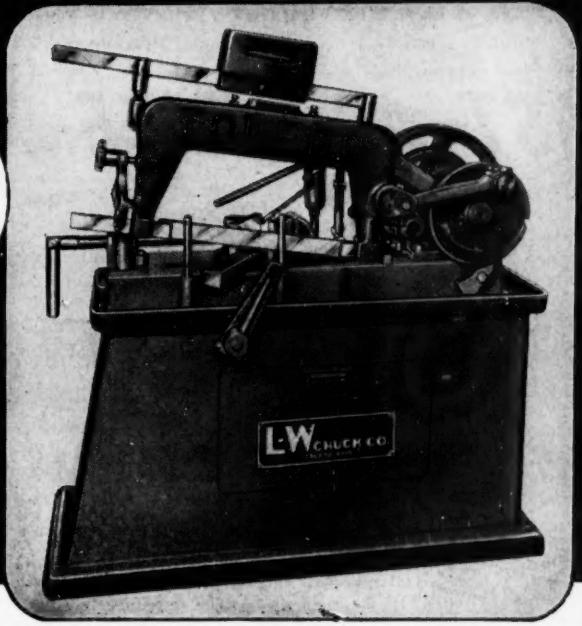

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ing of centrifuse brake drums and silicon aluminum pistons, permitting brakes to be improved and reducing piston wear in the newer higher speed engines.

The threat of suspended operations due to the pressure of the depression spurred on development work at an accelerated pace. Fifty new experimental grades of cemented tungsten carbides brought the total in 1933 to 200, but only seven of them were suitable for commercial use of one kind or another.

But the fading of brazing troubles—eliminating a major source of spoilage and costly rejections — seemingly marked an era of progress.

In 1934 diamond wheels for grinding carbides began to appear along with grinders to use them. This permitted carbide blanks to be shaped into thinner sections without chipping or breaking them. Almost overnight a demand for cemented tungsten carbides began to develop. Auto producers were applying the super - hard metal for 320 machining operations on 109 different parts.

During the next year evidence that carbide tools produce substantial savings steadily multiplied. Four machines tooled with cemented carbides did the work of 16 in machining cast iron refrigerator heads. The metal also eliminated the necessity of buying $30,000 worth of machines to produce

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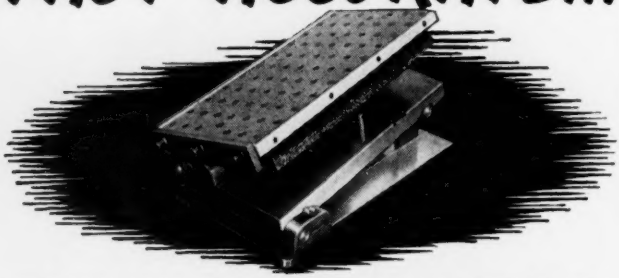

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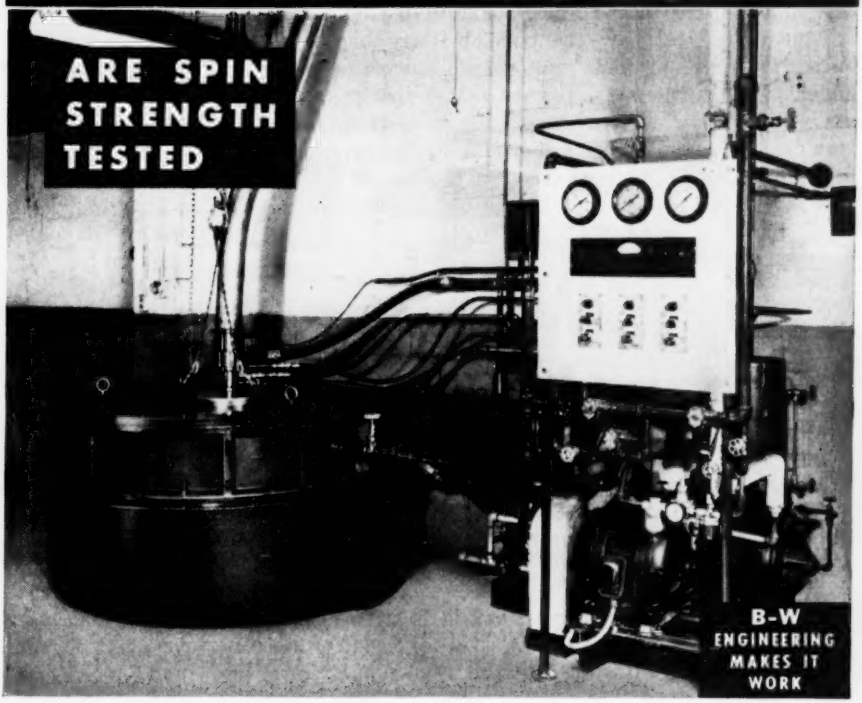

To determine the bursting speed of ROCKFORD CLUTCHES, they are spun up to a high R.P.M. in this air turbine speed chamber. This test assures they will continue to perform efficiently at the speeds for which they were designed. Let ROCKFORD engineers devote the benefit of this and many other tests to *your* product's clutch design.

B-W PRODUCTION MAKES IT AVAILABLE

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truck brake drums, and tantalum grades began to make a good showing at Frankford Arsenal in turning shells.

That same year saw the development of the first carbide "pill press" which presaged the start toward real mass production of cemented tungsten carbide cutting tools. Other manufacturing developments, such as a new brazing furnace that increased braze strength 80 per cent, special equipment for producing extremely dry hydrogen to improve product quality and an extrusion process for producing tubes, spirals, and shaped bars virtually "by the yard" finally were instrumental in taking carbides out of the cut and try stage, and the company out of the red for the first time in 12 years.

With the wider adoption of carbide cutting tools, changes appeared in the machine tool field. Machine tools began to be built sturdier and to operate at faster speeds; sturdier to withstand the strain of deeper cuts; faster to make maximum use of the diamond-like characteristics of the super cutters.

Production facilities of the Carboloy plant kept pace with the expanding demand. In 1939, a new plant was built in Detroit and only last year a 3½ million dollar branch went into operation at Edmore, Michigan. Grade development work is so advanced that

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THE CINCINNATI TOOL COMPANY

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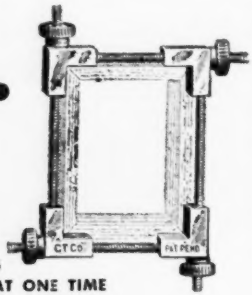

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Available from stock in four popular sizes, 8", 12", 18", 24". Larger sizes can be furnished when required. Minimum capacity all sizes 2" by 2".

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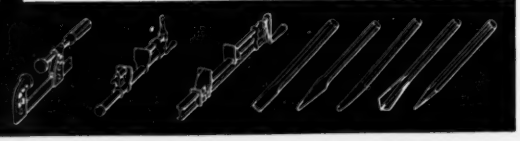

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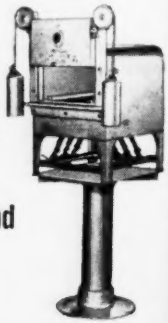

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Today, cemented carbides are extremely versatile. Because they are basically a powdered metal product, infinite content variations are possible that provide carbides to meet numerous specific application needs. Titanium, tantalum, chromium and other metal powders can be combined in carefully controlled amounts to produce the exacting physical properties desired.

3-D Girl at SKF

THIS attractive young miss is multiplying the power of her eyes with a "Magni - Focuser," the third-dimensional (3-D) binocular magnifier, to inspect a tiny ball bearing at the SKF plant in Philadelphia. The operator's two hands are always free while using the magnifier, which is made by Edroy Products Company of New York and includes matched and balanced precision ground and polished prismatic lenses of the finest optical glass.

Pantography at Work

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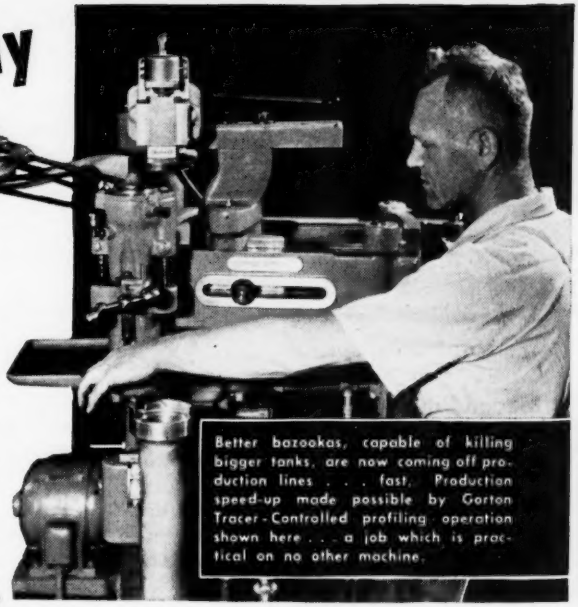
Inside profiling operation produces more than 36 pieces per hour with Gorton Tracer Control. Approximate time by the next best method . . . one piece every two hours.



Better bazookas, capable of killing bigger tanks, are now coming off production lines . . . fast. Production speed-up made possible by Gorton Tracer-Controlled profiling operation shown here . . . a job which is practical on no other machine.

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On many all-but-impossible jobs, Gorton Tracer-Controlled Pantographs and Duplicators speed up production on military or industrial contracts. High surface finish results from spindle speeds up to 45,000 R.P.M. Accuracy results from the use of over-size masters, patterns, or templates together with the reduction ratio which is exclusively characteristic of the pantograph. Whether a dozen or a thousand pieces, each is identical to the first. Work piece size varies from instrument parts to areas of 10 to 20 feet.

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Mail the coupon below for General Catalog illustrating the complete Gorton line.

PRODUCTION DATA—

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka

MATERIAL: Aluminum alloy

CUTTER: 5/32" dia. single flute, fast spiral H. S. steel running at 3,900 R.P.M., without coolant

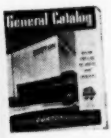
MASTER: 2 masters: one for male and one for female sections; 3 times oversize, traced manually

HOLDING FIXTURE: Pneumatic-operated internal expanding type

APPROX. TIME: 36 pieces per hour

ALTERNATE METHODS: None practical

GEORGE GORTON MACHINE CO.



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Please send at once complete information about the Gorton line contained in Bulletin 1655-1709.

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news of the industry

Macco Products Constructing New Plant

Macco Products Company has announced the construction of a modern, new plant to be located in a square block between 92nd and 93rd Streets on Sangamon Street in Chicago. The new building is to be of one-story brick construction, will have 40,000 square feet of floor space, and will afford 150 per cent additional production capacity. The plant will feature a fire and explosion-proof compounding room. Designed with the receiving department at one end and the shipping department at the opposite end, the building has been planned so that there will be a constant flow of processed material passing through the plant.

The company produces special drawing and cutting oils, cleaning and rust-proofing solutions, and other compounds for steel processing. The new plant is expected to be ready for occupancy this fall.

Feedall Moves into New Plant

Feedall Machine & Engineering Company, designer and builder of automatic hopper feeds and similar special selector devices, has recently moved to its new plant located at 38399 Pelton Rd., Willoughby, Ohio. The new steel and aluminum building provides better shipping facilities and more than doubles the capacity of the company's former quarters at 29 Elm St. in Willoughby. Recent appointments made under the expansion program are Richard H. Crotty, chief engineer, and Claude C. Sowers, production manager. Lewis R. Winslow will remain as president and sales manager.

Architectural sketch of new plant of Macco Products Co., Chicago, Illinois

New Grinding Wheel Factory Added to Norton Behr-Manning Overseas Group

The newest member of Norton Behr-Manning Overseas Incorporated's group of foreign plants was dedicated recently in Belfast, Northern Ireland, thus bringing to 12 the number of grinding wheel and sandpaper factories operated by the export organization of Norton Co., Worcester, Massachusetts.

The new plant, Behr - Manning Limited, located on Castlereagh Rd., Belfast, is equipped to manufacture coated abrasive papers and cloth, such as roll goods, ream sheets, discs, belts, and specialties. Additional machinery is currently being installed which will allow the plant to readily manufacture the entire range of Behr-Manning coated abrasives.

A. Donald Kelso, president of Norton Behr-Manning Overseas, Inc., is managing director of the new facilities; Charles Z. Smith is works manager and engineer; Leonard K. Brooks is sales manager; G. M. S. Grant is production manager; and D. W. S. Birnie is accountant. Directors include Milton P. Higgins, Norton Company president; Ralph F. Gow, Norton Company executive vice president; Mr. Kelso; Elmer C. Schacht, Behr-Manning Corporation president; John C. Ewer, Norton Grinding Wheel Company, Limited, managing director; and Henry Morris, legal counsel.

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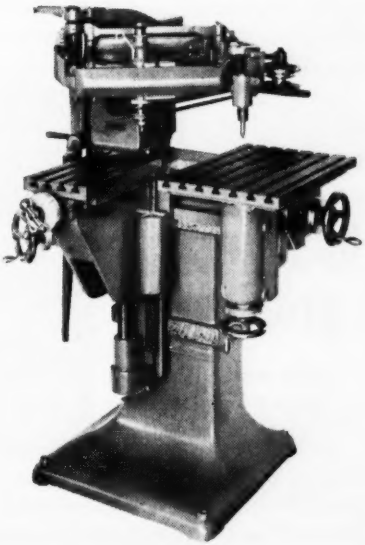

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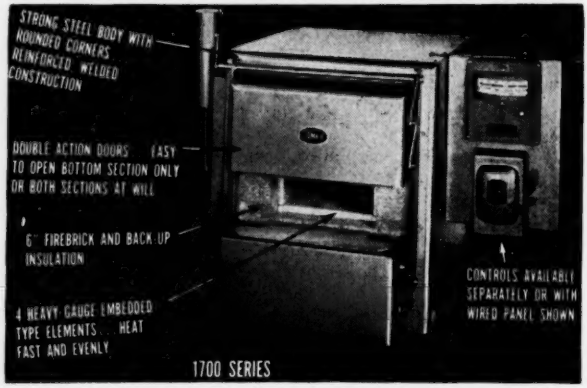
Illustration showing (left) C. Fred Watkins, sales manager, Heller Brothers Co., Newcomerstown, Ohio, and Herbert Wise, account executive, Byer & Bowman advertising agency, examining the new Vixen Curved Milled Tooth File catalog

Heller Publishes Six New File and Tool Catalogs

C. Fred Watkins, sales manager, Heller Brothers Co., Newcomerstown, Ohio, has announced the completion of six new catalogs showing the complete line of Heller files and tools. All the catalogs are printed in two colors and completely illustrated, with separate price lists prepared for each catalog. The accompanying illustration shows Mr. Watkins examining the new Vixen Curved Milled Tooth File catalog with Herbert Wise, account executive, Byer & Bowman advertising agency. Spread on the desk are the

solve heat-treat problems

with versatile Temco bench-type furnace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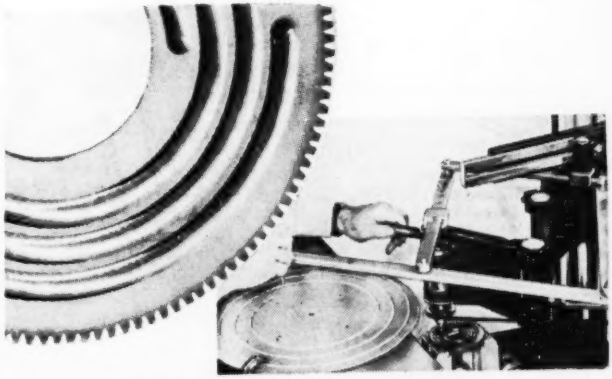
other new catalogs, including the handy 64-page file catalog which has 200 illustrations and describes 1686 American Pattern, Swiss Pattern, and milled curved tooth files and rasps, in addition to various types of special holders and handles.

Other catalogs illustrate and describe Nucut American Pattern files, Heller Swiss Pattern files, American-Swiss Swiss Pattern files, and American-Swiss American Pattern files.

S-J Club Host to Machine Tool Builders

The Management Club of Scully - Jones & Co., Chicago, Ill., played host recently to a group of representatives of machine tool builders from the northern Illinois area. Included in the program were a tour of the Scully - Jones plant, a dinner for guests and members of the club, and a business meeting. Paul Gruber and Robert Fisher of the Cincinnati Milling & Grinding Machine Company, Cincinnati, Ohio, were guest speakers at the meeting.

Representatives from the following firms were present: Cincinnati Milling & Grinding Machine Co., Cincinnati, Ohio; Caterpillar Tractor Co., Joliet, Ill.; D. A. Stuart Oil Co., Chicago, Ill.; and Barber-Colman Co., W. F. Barnes Co., John Barnes Co., Barnes Drill Co., Greenlee Brothers Co., Ingersoll Milling Machine Co., Rehnberg-Jacobson Co., and Sundstrand Machine Tool Co., all of which are located in Rockford, Illinois.



PANTOGRAPHIC
MILLING OF SPIRALS
ON METALS AND PLASTICS
Rapidly done by unskilled labor
with NEW HERMES Engravograph

Write for Literature
Catalog H 27 Bench Type Model
(weight 200 lbs.)
Portable Model IM also available

Production: 6" brass spiral with 1/4" x 1/4" groove cut from 3 times larger template Time: 12 units per hour.

NEW HERMES, INC. 13-19 University Place, N. Y. 3
Representatives in all principal cities. Canada—259 St. James St., Montreal

eliminate elaborate set-ups and operations

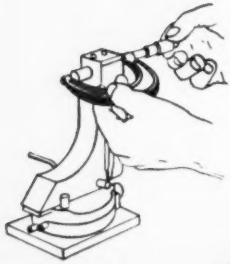
.0001" ACCURACY

Fluidmotion

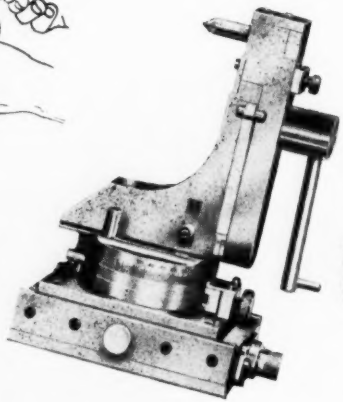
WHEEL DRESSERS

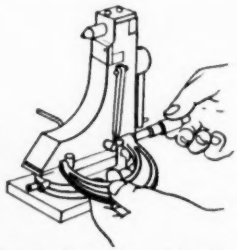
dress two angles tangent to a radius in one continuous motion

High-Carbon, High-Chrome Construction

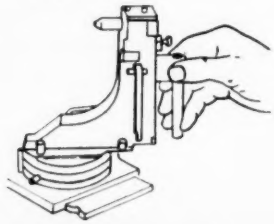


Step 1. Obtain micrometer reading as shown, and add required convex radius or subtract required concave radius.





Step 2. Next loosen gib with wrench and "mike" over lower pins to reading obtained in Step 1.



Step 3. Tighten gib; set stops for two angles; ready for action.

ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

With the "Fluidmotion" Dresser, you can dress two angles tangent to a radius—usin gone handle in one continuous motion. Operation is so fast and simple that beginners can use them to boost your grinding machine out-put. Forms are always clean, precise—angles and radii "flow" into each other. Contours are consistently sharp, accurate to .0001", without tool or chatter marks.

J & S TOOL CO., INC.
645 W. Mt. Pleasant Ave., Livingston, N. J.
(N. J. Highway Route No 10)

New home of J & S Tool Co., Inc.

J&S TOOL CO. INC.

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

J & S Tool Co., Inc. distributors are located in principal cities

ARKANSAS, FT. SMITH
Sam K. Stone, phone 2-1221

CALIFORNIA, MAYWOOD
Franklin E. Smith & Assoc., phone Kimball 0914

CALIFORNIA, SAN FRANCISCO
Joseph C. Fletcher, phone Underhill 1-2991

GEORGIA, ATLANTA
Industrial Service Co., phone RA 1195

ILLINOIS, CHICAGO
Boyd-Wagner Co., phone Haymarket 1-1200

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The Geo. O. Desautels Co., phone Wabash 2403

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William J. Leppert, phone Hamilton 3661

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MICHIGAN, GRAND RAPIDS 6
Joseph Monahan Co., phone 8-5917

MICHIGAN, SAGINAW
Saginaw Supply Co., phone 5-3447

MINNESOTA, ST. PAUL
Forcey Machine Tool Sales, phone Prior 1822

MISSOURI, ST. LOUIS
H. O. Monahan Co., phone Sterling 6574

NEW YORK, BUFFALO
Galvin Machinery Sales, phone Grant 4341

NEW YORK, NEW YORK
P. M. Company, phone Canal 6-7140

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Syracuse Supply Co., phone Syracuse 2-9231

OHIO, CINCINNATI
Peter O. Boylan, phone Valley 3997

OHIO, CLEVELAND
Garco Machinery Co., phone Kenmore 1-9120

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The Monnier Tool & Supply Co., phone MI-4717

OHIO, TOLEDO 12
Wright Industrial Supply Co., phone Kingswood 5752

OREGON, PORTLAND
Geo. E. Zweifel & Co., phone Beacon 1412

PENNSYLVANIA, PITTSBURGH 33
Gilling Engineering Co., phone Allegheny 1-1420

PENNSYLVANIA, PHILADELPHIA 40
Lemuel R. Lance, Inc., phone Davenport 4-0700

TEXAS, DALLAS
C. G. Wilson Co.

UTAH, SALT LAKE CITY 9
The Lang Co., Inc.

WASHINGTON, SEATTLE
L. C. Thatcher, phone Seneca 4948

WISCONSIN, MILWAUKEE 13
Ed Schuerer Sales, phone GL 3-2960

CANADA, TORONTO 5, ONT.
J. H. Ryder Machinery Co., phone Princess 6611

Parker-Kalon Cites Sentry for 15 Years of Service

Parker-Kalon, New York manufacturer of nuts and screws under the slogan "If it's P-K, it's O.K.!", recently awarded the P-K okay to The Sentry Company, maker of industrial electric furnaces and equipment for heat treatment of metals. "We have been using our Sentry furnaces on a multiple-shift basis for more than 15 years," said Harold Rosenberg, works manager at Parker-Kalon. "Throughout that period we have relied on Sentry . . . it's gratifying to know that we can depend on Sentry to help us maintain our P-K quality." Parker-Kalon, according to Mr. Rosenberg, has consistently used Sentry equipment and methods for heat treating all its high-speed, high-carbon, and high-chrome steels.

Norton Establishes Job Lapping Department

To further advance improvement of product performance in the metals industry through greater use of precisely lapped parts, Norton Company's Grinding Machine Division at Worcester, Mass., has announced the establishment of a new department, called the Norton Job Lapping Department, to broaden its lapping capacity to handle a multitude of job lapping projects. Expanded facilities in the new department include machines for single and parallel face-flat lapping; external cylindrical lapping jobs for high precision requirements; flat work up to 24 inches across with larger sizes possible by special arrangement; and cylindrical work from $\frac{1}{16}$ inch in diameter x $\frac{1}{2}$ inch long to 2 inches in diameter x 8 inches long.

Direct supervision of the expanded activity is by lapping engineers who pioneered the process of mechanical lapping and developed the line of lapping machines.

Pratt & Whitney Announces Executive Changes

Top management changes at Pratt & Whitney, Division Niles - Bement - Pond Co., West Hartford, Conn., have been announced by Frederick U. Conard, president. In addition to eight promotions, Mr. Conard announced the retirement of Charles M. Pond and Hubert D. Tanner, both of whom have served the company as vice presidents and directors. The promotions made were: Vice President Richard W. Banfield to succeed Mr. Pond as manager of the small tool and gage division; Edward N. Clark, superintendent of the small tool division; Harold G. Lucas, superintendent of the gage division; William R. Back, superintendent of aircraft parts manufacture; Albert L. Knapp, general superintendent of the machinery division; Edward J. Ferris, assistant general superintendent of the machinery division; Edward J. Shages, manufacturing superintendent of the machinery division; and Sandford G. Etherington, Jr., supervisor of planning. Messrs. Clark, Lucas, and Back will report to Irwin F. Holland, general superintendent of the small tool and gage division.

(Left) Hubert D. Tanner. (Right) Charles M. Pond

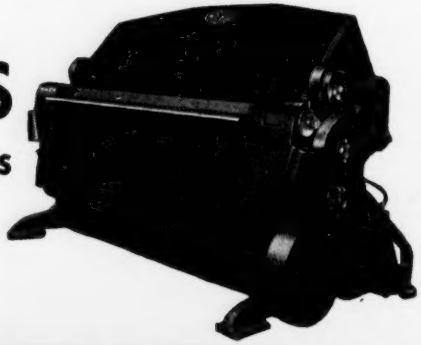
CHICAGO STEEL HAND and POWER

BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE and SHEET METAL

Special Bending Brakes
Double Folder Brakes



DREIS & KRUMP MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

SANFORD
SURFACE GRINDER
MODEL MG

For Dry or Wet* Grinding!

PRECISION • SPEED • SENSITIVITY

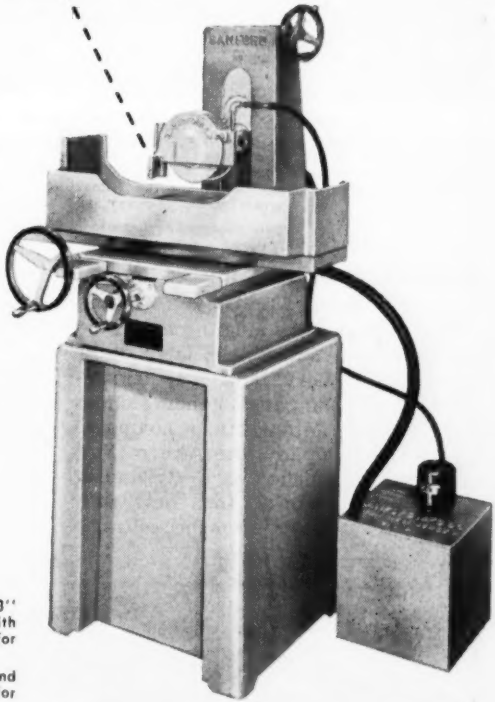
Built by manufacturers who concentrate on small grinders only, each Sanford Grinder is an individual project of time tested and proved basic design. Although modest in price, no quality undermining shortcuts are employed to reduce manufacturing costs. Constant repeat orders prove its acceptance.

This sensitive machine grinds to micro-inch accuracy with no vibration, with maximum dimensional stability. Here's why:

- **Transverse ways are double Vee (VV) Meehanite inserts instead of flat surfaces which depend upon unstable jibs for alignment and accuracy.**
- **Needle, Ball and Oilite Anti-Friction bearings are used throughout.**
- **Alignments are electronically checked for accuracy.**
- **Precision slides are ground, lapped and hand spotted.**
- **Dials are large and legible.**

SPECIFICATIONS — 8¾" transverse — 13" longitudinal—12" vertical under 7" wheel with Adapter. Approximate weight 630 lbs. Send for illustrated bulletin.

Replacement parts, special attachments and reconditioning facilities are available. Send for price list.



*With optional equipment

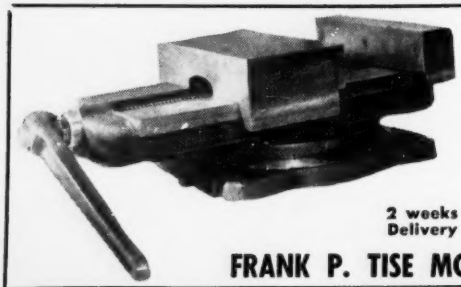
SANFORD MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

Individuals attending the Almco sales meeting: Standing in the background are Harold Mickelson, in charge of the laboratory; Lee Watkins, director of sales and research; R. C. Trow, vice president and general manager; James Tschann, sales coordinator; and Chet Piotrawski, sales engineer. Seated at the tables are the Almco sales engineers attending the meeting presided over by D. J. Foley, secretary and legal advisor.

Almco Supersheen Holds General Sales Meeting

The largest sales meeting ever held by the Almco Supersheen Division of Queen Stove Works, Inc., was held recently at the company's general offices in Albert Lea, Minnesota. A comparatively new company, the Almco Division was established as a division of Queen Stove Works, Inc., only four years ago and has since become one of the world's largest manufacturers and distributors of barrel finishing equipment and materials.

More than 20 men participated in the meeting. In charge of general arrangements was R. C. Trow, vice president and general manager of Almco Supersheen, with N. L. Watkins, director of sales and research, in charge of the technical discussions and demonstrations.



Graduated Swivel Vise for Shapers

11½" jaw width, 2½" jaw depth. 13½" vise opening. Base, 12"x14". Keys are 11/16" or made to your specifications. Holes for tee slot bolts made to order. Net weight 235 lbs. Shipping weight 270 lbs.

$262.50 F.O.B. Kansas City

2 weeks Delivery

FRANK P. TISE MCHRY. CO. 1246 SWIFT AVE. NO. KANSAS CITY, MO.

40 YEARS

OF LEADERSHIP

Management and employes take pride in announcing to our many friends and customers that Eclipse Counterbore Company became 40 years of age in May. From a humble beginning in 1913 to a position of leadership in 1953, Eclipse is today truly synonymous with quality in the cutting tool industry. This healthy maturity could never have been attained without the help of those same friends and customers . . . and so to them we say "Sincere Thanks."

The orginal Eclipse interchangeable single-diameter counterbore created in 1913.
A modern multi-diameter carbide tipped Eclipse Cutter.
1913
1953

ECLIPSE COUNTERBORE CO.

Founded in 1913

DETROIT 20, MICHIGAN

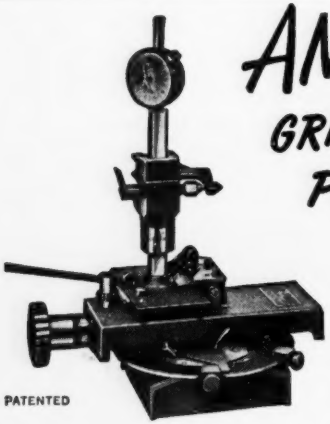
Chicago Pneumatic Tool Company Acquires Jacobs Manufacturing Company

Chicago Pneumatic Tool Co., New York 17, N. Y., has announced that it has acquired the assets of The Jacobs Mfg. Co., West Hartford, Conn., manufacturer of the well-known Jacobs chucks. According to Chicago Pneumatic, manufacturing and sales operations will not be affected by the sale and will be carried on without change by a new wholly-owned subsidiary of Chicago Pneumatic called The Jacobs Manufacturing Company, a New Jersey corporation. Present personnel and company policies will not be altered in any way.

Gairing Tool Company Acquires Drill Line of Conner Tool Company

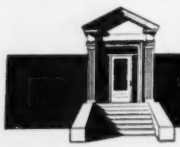
The Gairing Tool Co., Detroit 32, Mich., has acquired outright the line of interchangeable spade drills and core drills formerly manufactured by the Conner Tool & Cutter Company, Detroit, Michigan, and Sullivan, Indiana.

The transaction included trade name, manufacturing facilities, and inventory. All operations have moved to the Gairing plant in Detroit where all manufacturing will be carried out in accordance with Conner high - quality standards of design and workmanship. Sales of the newly acquired Conner drill line are currently being handled through Gairing Tool Company's national sales organization.



ANOTHER GRINDING ROOM PROBLEM SOLVED!

The small, precision-built machine you see above is the Radi-Form, a grinder attachment, that does almost everything but talk. The Radi-Form can move the work in a predetermined arc of any desired radius, from 1/16″ to 2″ concave, from .00 to 2″ convex, which means that radii can now be generated even on carbide tipped cutting tools in a matter of minutes, to within .0005 accuracy on a standard, unformed, cupped diamond wheel. You save headaches, time, and gain increased production. Write for literature and prices that will surprise you.



W. F. MEYERS CO., INC., BEDFORD, INDIANA

The Land You Build On Requires Marking Devices

When measuring land areas or construction sites, surveyors mark boundaries with stakes or chalk. Working crews then can depend on these marking devices to insure dimensional limits and safeguarding of property rights.

CADILLAC 45
HYDRAULIC MARKING MACHINE

The Perfect Machine for Flat, Round and Contour Marking

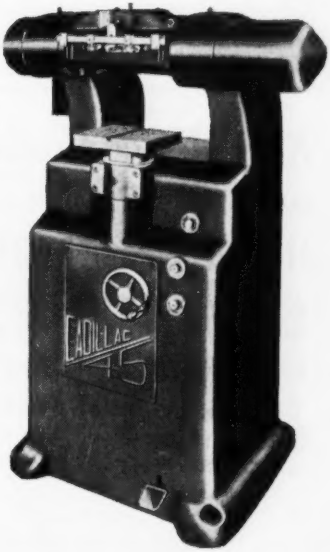
PUNCH PRESS DIE
Faithfully reproduces and is particularly adapted to large production marking.

SOLID ROLL DIE
Assuring the utmost in accuracy—used in marking machines, lathes and screw machines.

ENGRAVED STEEL SEGMENT DIES
Segment die system ideal for stamping circular and flat work (trademarks, sizes, etc.).

Write for Bulletin SE-130

Compact, self-contained and manifold mounted, this machine gives full range of marking depth with one control from extremely shallow impression up to very deep impression. It will mark round, flat and irregular surfaces. Features: repeat action; capacity up to 110 one inch strokes per minute; up to 12,000 lbs. pressure.



For full information, write for Bulletin H-45

CADILLAC STAMP CO.
FACTORY and OFFICES
17319 RYAN ROAD • DETROIT 12, MICH.

New, modern office of Michigan Chrome & Chemical Co., Detroit 13, Michigan

Michigan Chrome Moves Into New Office

Michigan Chrome & Chemical Company has moved into a new, modern office located at 8615 Grinnell Ave., Detroit 13, Mich. The office, built in conjunction with the company's new plant, brings management, sales (both chemical and plating divisions), accounting, and purchasing under one roof, thus enabling the firm to better serve its customers than when the offices were separated.

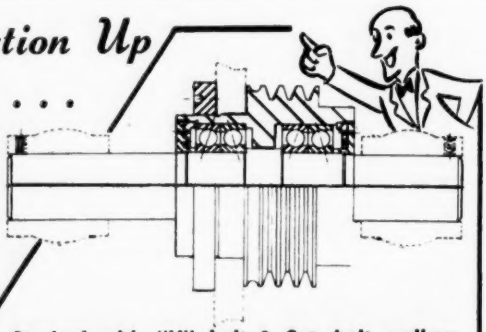
A total of 5,000 square feet of floor space is used for all the functions of the new office, and all modern equipment is employed. Ample off-the-street parking is available.

Keep Your Production Up with Whitnon . . . . . .

INTERCHANGEABLE SPINDLES

for BROWN & SHARPE UNIVERSAL GRINDERS

- **for FINEST FINISHES**
- **SQUAREST SHOULDERS**



Stocked with "V" belt & flat belt pulleys. No more plain bearings to scrape and run in. Preloaded precision ball bearings allow no end shake. Wheels and belts are changed without exposing the bearing to grit and disturbing the adjustment. The bearings are grease lubricated and sealed at assembly. Write today for price and delivery for B&S #1, 2, 3, 4, and 11 Universal Grinder spindles.

THE WHITNON MANUFACTURING COMPANY

217 HIGH STREET NEW BRITAIN, CONN.

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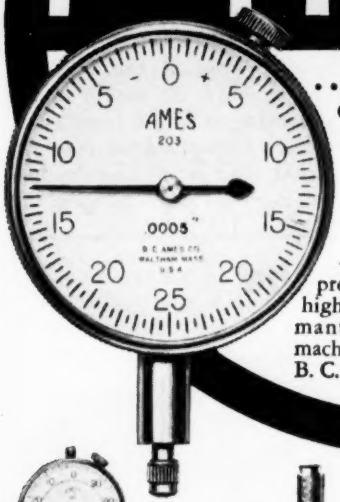


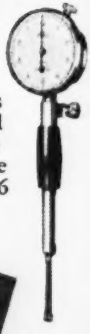
...the preferred Dial Indicators

One of America's largest and most famous mass-producers recently chose Ames as preferred source of supply for indicator gauges. They did because the four sizes of Ames "Hundred Series" indicators fit every measuring requirement; they are *accurate, sensitive,* low in friction, yet are *rugged* and *tough* —give *more* on-the-job time. All Ames products embody latest design and highest-quality materials; they are manufactured by methods and machines that are *exclusive* with B. C. Ames Co.

Ames Dial Depth Gauge No. 11C

Ames Dial Micrometer No. 517

Ames Amplifying Dial Comparator No. 26



Ames Small Hole Gauge No. 36

Send today for your free copy of Catalog No. 58

Representatives in principal cities. **B. C. AMES CO.** *29 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

Wash drawing of new plant of John Hassall, Inc., Westbury, Long Island

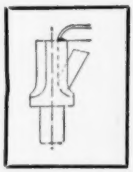
Century-Old Brooklyn Firm Builds Plant in Westbury

John Hassall, Inc., has announced the construction of a new plant located on Cantiague Rock Road between Northern State Parkway and Jericho Turnpike in Westbury, Long Island. Covering an area of approximately 88,000 square feet, the new plant is situated on a 15-acre plot of ground and is of one-story construction. The framing of the building is of structural steel with 42 to 50-foot wide bays in one direction and 26-foot wide bays in the other direction. A clear height of 14 feet below girders is maintained throughout the entire factory area of the building. Four monitor bays, 22 feet 8 inches wide and varying in length from 240 to 280 feet, have been installed over the working area, thus permitting daylight to enter all portions of the factory. The

Punches Shaped from the SOLID with OTTMANN Punch Shaper

FEATURES:

1. No holder plates required.
2. Simple work mounting.
3. No re-setting — Work can be adjusted to any position of tool.
4. Forms shaped accurate. Parallel and true.
5. Minimum hand work.
6. Convenient, simple operation. Uses standard shaping tools.



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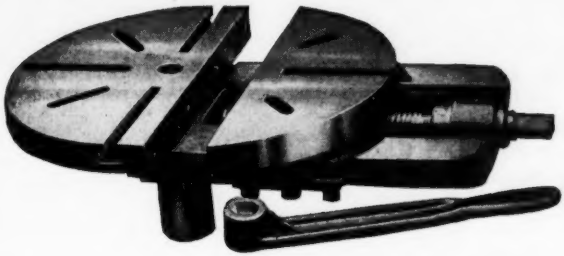
CEDAR-WEST TOOL CO., INC.

90 WEST ST. NEW YORK 6, N. Y.

Try the MODERN SAFETY DRILL TABLE



Under Our

FREE TRIAL OFFER

For Faster, SAFER Work in Your Maintenance Department

Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minutes set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.

WRITE FOR FREE FOLDER

Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.

MODERN MACHINE TOOL CO.
Jackson, Michigan

building is completely fireproof.

"Eye-brow" canopies have been installed over all factory widows on the north, east, and south elevations to prevent sun glare and to permit windows to remain open during rain showers. Approximately 5,000 square feet of office space occupies the northeast corner of the building. The new plant has facilities for a working force of 200 employees.

Challenge Machinery Observes 50th Anniversary

The Challenge Machinery Company is observing its 50th anniversary of manufacturing in Grand Haven, Michigan. The company first started in Chicago in 1870 as an electrotype foundry under the name of Shniedewend & Lee. In 1893, the firm was reorganized as The Challenge Machinery Company and moved to Grand Haven in 1903. Challenge now has three plants which have a combined floor space of 240,000 square feet, covering approximately 10 acres of land. More than 300 persons are employed.

The products manufactured by the firm include paper cutters, paper drills, printing and proofing presses, quoins and keys, iron furniture, and other printing equipment, plus a line of precision equipment for the metal-working industry. Current company officers are J. Edgar Lee, president; J. Wesley Lee, executive vice president; Ralph G. Wilson, treasurer; and E. Paul Babcock, secretary.

CHAMPION
E-X-P-A-N-D-I-N-G
MANDRELS

Precision Model

Standard Model

give speed to every set-up

The flexible sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand — no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

Precision Model has expansion range of .010". Available in regular sizes to fit holes from ½" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals — from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from ½" to 9½" diam.

CHAMPION *Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.*

WESTERN TOOL & MFG. CO., INC.

Dept. 28 **Springfield, Ohio**

Extra !

CUTTING-ABILITY
SERVICE-ABILITY

The quality of a broach is not only on the surface . . . it must go clear through to the core. With the finest steel heat-treated to exact temperatures and exposures, and precision machining, Connecticut Durakeen Broaches give you more pieces per grind, more grinds per broach . . and better quality work.

The performance of a Connecticut Broach is determined to a mathematical certainty before the steel is touched . . . before a tooth is cut. A Durakeen Broach has no uncertainty in it . . . at any stage of its making or use. "Better Broach it with Connecticuts!"

CONNECTICUT

DURAKEEN BROACHES

DURABILITY
WITH KEENNESS

THE CONNECTICUT BROACH AND MACHINE COMPANY
NEW LONDON, CONNECTICUT

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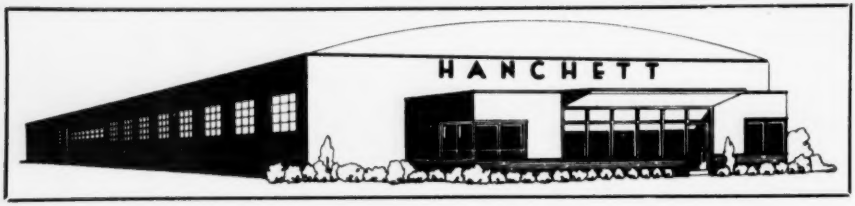
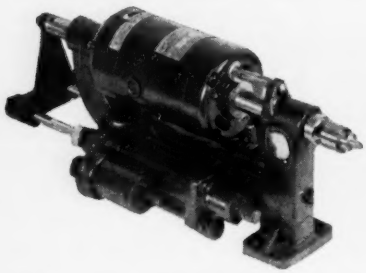


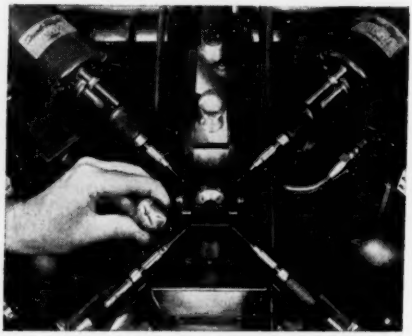
Drawing of new Hanchett West Coast plant, Portland, Oregon

Hanchett Constructs West Coast Branch Factory

Hanchett Manufacturing Company has announced the construction of a new West Coast branch factory, warehouse for replacement parts, and sales and service offices which will be located at Macadam Avenue and Flower Street in Portland, Oregon. Increased manufacturing facilities, represented by a considerable amount of new machinery, are included in the expansion program. Complete stocks of replacement parts will be carried at the new warehouse so that efficient customer service may be maintained.

The offices will be staffed with management, sales, and service personnel who are specially trained for their jobs. By enlarging its present facilities, the company will be able to provide better and more efficient equipment in meeting service demands of West Coast users of Hanchett products.





SMALL HOLE DRILLING SPEEDED AUTOMATICALLY

. . . and at low cost with Electro-Mechano compact drill units. Typical set-up above is used by a Racine screw machine company; four units drill #50 holes in stainless steel fuel nozzle caps. Production was increased from 40 to 190 pieces per hour.

These fast acting complete drill units speed up many simple drilling jobs and simplify complicated multi-spindle jobs. Direct electric motor drive variable speed spindle provides 1000 to 10,000 or 2500 to 15,000 RPM; employs economical air feed with adjustable hydraulic rate control. Supplied in pad or column mount, with manual, electric or automatic trip; drill cap. .004 to .156". Precision sensitive bench and floor models available up to ½" cap.

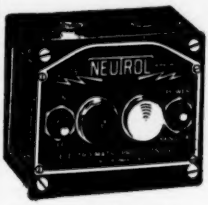
FOR SIMPLE OR COMPLICATED SET-UPS

get more information, write:

The ELECTRO-MECHANO CO.,
265 East Erie Street, Milwaukee 2, Wisconsin

ELECTRICAL CONTROLS FOR INDUSTRY

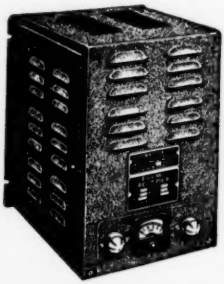
NEU T ROL
ELECTRO-MAGNETIC CHUCK CONTROL



50 to 15,000 Watts . . . 60 to 20,000 Sq. In. Chuck Area.

Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production.

ELECTRO-MATIC RECTIFIER



50 Watts to 40 Kilowatts

Engineered for dependable power conversion in constant year after year service. Quiet and efficient. For all industrial applications.

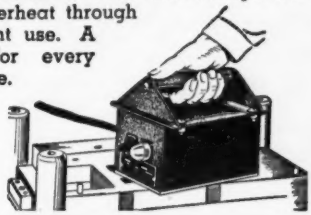
NEUTR⊙LATOR

NEUTROL CHUCK CONTROL and HOLDING POWER REGULATOR

Combines the advantages of NEU-T-ROL with the benefits of absolute voltage regulation. Control of holding power is infinitely variable through entire dial range. Best holding power predetermined for an operation is automatically repeated. Assures true parallel grinding. Manual or automatic control models.

ELECTRO-MATIC A.C. DEMAGNETIZER

Demagnetizes dies, punches, cutters, tools that have been magnetized from any source. Works by simple contact. Operates on standard A.C. voltage. Will not overheat through constant use. A size for every purpose.



All Models Fully Warranted

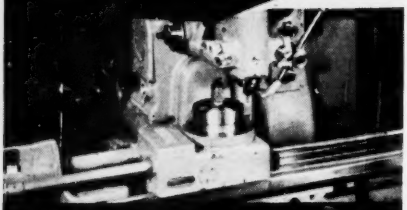
Special Models Engineered to Meet Every Need

Your Inquiries Will Be Promptly Answered Without Obligation.

ELECTRO-MATIC PRODUCTS CO.

2235-37 N. KNOX AVE., CHICAGO 39, ILLINOIS, U. S. A.

How To Increase Production And Improve Accuracy



With a SUNDSTRAND Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

Accurate Spacing, Powerful Clamping Insures Accuracy

Sundstrand Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today. Ask for bulletin 536.

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

Lempco Elects New Officers

Lempco Products, Inc., Bedford, Ohio, manufacturer of automotive machine shop equipment and industrial machine tools, has announced the appointment of James J. Strnad as president. Mr. Strnad was formerly vice president and general manager. James F. Strnad, former president and founder of the company, will continue as chairman of the board. In other management changes, William J. Blazek has been named president of Evans Reamer & Machine Co., Lexington, Ohio, subsidiary of Lempco, and Albert B. Harding, Lempco Products vice president in charge of sales, has been given the additional duties as president of Lempco Automotive, Incorporated.

Dorothy Kimmel has been appointed vice president of Lempco International, export division of the company, J. F. Fahey and Herbert A. Spring, Jr., treasurer and secretary respectively, will assist Mr. Strnad as president.

"It's a check for a short beer!"

How to solve

39 PRODUCTION PROBLEMS

with Mead Air Devices

Ready!

SEE how to use standard Mead units to make automatic or semi-automatic machines!

New 16-page Mead PHOTO-BOOKLET presents actual examples in pictures and text of 39 different, typical production problems solved by various combinations of Mead Air Operated Devices. Alert production men will readily adapt the ideas to their own needs. This interesting booklet shows how. *Write today for booklet "Air Power at Work."*

MEAD SPECIALTIES CO.

Dept. AA-93, 4114 N. Knox Ave., Chicago 41, Ill.

Write for **NEW "BOOKLET 39"** *Now!*

Metal-Working News in Brief

Landis Machine Co., Waynesboro, Pa., has announced the relocation of its Chicago and Cleveland offices. The Chicago office, under the supervision of **Paul A. Reynolds,** is now located at 6920 W. North Ave., Chicago 35, Ill. The Cleveland office, under the supervision of **E. O. Peiffer,** is now located at 13967 Cedar Rd., Cleveland 18, Ohio.

Arthur E. Bayley has been appointed treasurer of U. S. Steel Supply Division, U. S. Steel Corp., Chicago 90, Ill. Mr. Bayley fills the position that was formerly held by **Frederick C. Teuteberg** who died recently.

— o —

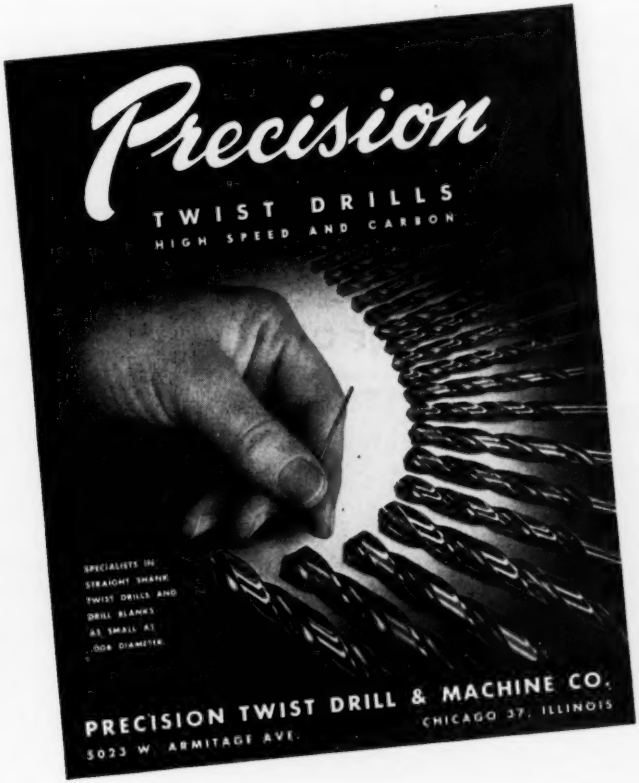
Industrial Filtration Co., Lebanon, Ind., has announced that Delpark industrial filters will be manufactured and marketed by the **DeLaval Pacific Organizations** on the West Coast. Manufacturing will be handled by the DeLaval Turbine Pacific Company while the sales, covering the territories of California, Washington, Oregon, Nevada, Idaho, Arizona, Alaska, and Hawaiian Islands, will be handled by the DeLaval Pacific Co., 61 Beale St., San Francisco 5, California.

— o —

Wales-Strippit Corp., North Tonawanda, N. Y., has announced the appointment of **Edward P. Smith** as sales engineer in the Manhattan - Long Island territories of New York. Mr. Smith recently completed a sales engineering course at the company's North Tonawanda plant.

JEVIN ®
MICRO-DRILL PRESS
for holes as small as .002"
Designed to hold small drills in precision collets. Absence of a sliding quill guarantees extreme sensitivity with finger-tip control. A mounted 1/8" capacity drill chuck can also be used.
Write for Bulletin H describing the Micro-Drill Press and listing collet sizes. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, California.

For the Finest Small Twist Drills


Precision
TWIST DRILLS
HIGH SPEED AND CARBON
SPECIALISTS IN STRAIGHT SHANK TWIST DRILLS AND DRILL BLANKS AS SMALL AS .008 DIAMETER.
PRECISION TWIST DRILL & MACHINE CO.
5023 W. ARMITAGE AVE.
CHICAGO 37, ILLINOIS

Write for this New Catalog and Price List

THIS IS OUR GUARANTEE!

"Any Precision made drill or tool must not only be entirely satisfactory to you, but must prove to be the most economical you have ever used or it can be returned for full credit."

Some Desirable Territories Open for Distribution

PRECISION TWIST DRILL & MACHINE CO.
5023 W. ARMITAGE AVE. CHICAGO 37, ILLINOIS

Metal-Working News in Brief

Scully-Jones & Co., Chicago, Ill., has named three stocking distributors to provide improved service to local industries in their respective areas. The distributors are **The E. A. Kinsey Co., Inc.**, 725 N. Capitol Ave., Indianapolis 4, Ind.; **J. M. Tull Metal & Supply Co., Inc.**, 285 Marietta St., N. W., Atlanta, Ga.; and **The E. A. Kinsey Co., Inc.**, 1020 W. 5th Ave., Columbus, Ohio.

Standard Pressed Steel Co., Jenkintown, Pa., has announced the appointment of **James L. MacDowell** as manager of tooling and quality, succeeding **Albert A. Leedom** who has been assigned to the staff of Cooper Precision Products, an SPS subsidiary in Los Angeles. **Herbert R. Fesmire** will succeed Mr. MacDowell as head of the automatics department. **Mark A. Hawkins** will replace Mr. Fesmire as general foremen in the department. **James B. Snyder**, cost accountant, has been made chief accountant, succeeding **Charles F. Roberts** who has also been transferred to Cooper Precision Products plant.

— o —

William F. Jenkins has been appointed sales manager of the Butterfield Division of Union Twist Drill Co., Derby Line, Vt., succeeding **L. H. Laythe** who will continue as office manager and sales consultant. **Blaine T. Hall** will assist Mr. Jenkins in sales promotion and advertising and **James T. McFadgean** becomes manager of the newly organized Customer Service Department of Butterfield.

16 HOLES -- THREE PRESSES — ONE OPERATOR!

FITS ON ANY DRILL PRESS

3 QUADRILLS ON 3 PRESSES DO WORK OF 16 SPINDLES AT RING MFG. CO.

QUADRILL

4-POSITION Instantly Adjustable tool drills, taps, reams, countersinks, counterbores — all on 1 drill press with 1 operator. Does work of 4 presses. Costs less than 1 press.

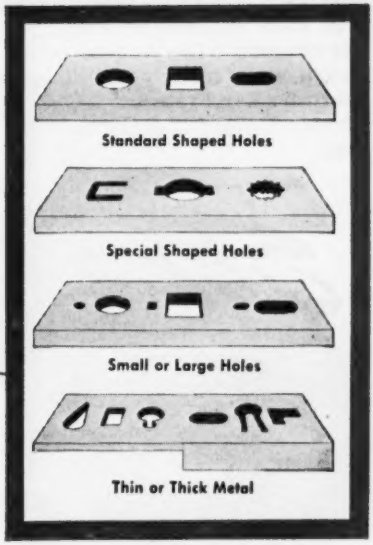
QUADRILL produces more holes faster—No time loss—Cuts production costs 33%.

Investigate this important time and work saver. *Write for Catalog Today*

CHICAGO QUADRILL CO.

1844 BUSSE HIGHWAY, DESPLAINES, ILLINOIS

WHEN R-B Punches Are Used



What are your piercing or forming requirements—standard or unusual shapes—small or large holes—steel or special alloys—thin or thick metals? There is either an R-B punch in standard shapes and sizes or R-B will manufacture special punches, die buttons and retainers to your specifications that will provide more efficient piercing operations.

Many hole-making applications, formerly requiring drilling or some other costly means, can now be done with R-B interchangeable punches. If you have thought your piercing jobs too tough for interchangeable punches, it will pay you to investigate the wide application potential of R-B standardized equipment.

R-B Engineering Service Is Available for Your Tough Piercing Problems.

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
Dept. 73 • 12625 Burt Rd. • Detroit 23, Mich.
Please send me additional information.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE ____ STATE _____

Also Produced in
OTHER ALLIED PLANTS
SPECIAL COLD FORGED PARTS
STANDARD CAP SCREWS
PRECISION GROUND PARTS
SHEET METAL DIES MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

Metal-Working News in Brief

Whitney Chain Co., Hartford, Conn., has announced the transfer of **T. Wayne Gehan** and the appointment of **Donald E. Boose** as power transmission sales engineers, working out of the company's Los Angeles office. Mr. Gehan was formerly associated with the firm's San Francisco district office, and Mr. Boose joined the company last year.

U. S. Hoffman Machinery Corp., Syracuse, N. Y., has announced the appointment of **John C. Walsh** to the post of superintendent of both the Lamson Street and Greenway Avenue plants. The company has also announced the appointment of **Leonard E. Petzinger** as sales engineer for the Cleveland area, in addition to the Cincinnati area which he has served for the past 18 months. Offices will be maintained in both cities.

— o —

Kurt Orban Co., Inc., New York 17, N. Y., has been appointed exclusive American distributor for the complete line of German-made Wafios wire forming, wire netting, spring making, and nail making machinery.

— o —

Ipsen Industries, Inc., Rockford, Ill., has announced the opening of a new sales and service division in Philadelphia, located at 3400 Tudor Street. **Mrs. Margaret Schramm** will be manager of the new office and will be assisted by **Alfred E. Stone,** sales engineer, and **John Keegan,** service engineer.

De-Sta-Co Toggle Clamps are extremely flexible in their application and are economically and easily adapted to work-holding fixtures for assembly, welding, bonding, machining or other production processes. Smooth, fast, powerful clamping action clamps parts quickly . . . holds them firmly in perfect alignment . . . releases instantly for easy removal and insertion of new workpiece.

De-Sta-Co clamps are engineered for rugged use in production; reamed bearing holes insure precision fit, long life and sensitive operation . . . offsets in handles and links relieve friction . . . made with cold drawn bars, and forged portable clamp parts. Accessories for adapting clamps to specific applications are available.

Write today for name of nearest distributor and your copy of the De-Sta-Co catalog which describes over 40 fixture and portable models with positive holding pressures up to 4000 pounds.

DESTACO **DETROIT STAMPING COMPANY**

349 MIDLAND AVE. • DETROIT 3, MICH.

Raise the feed . . .
Cut your die costs with . . .

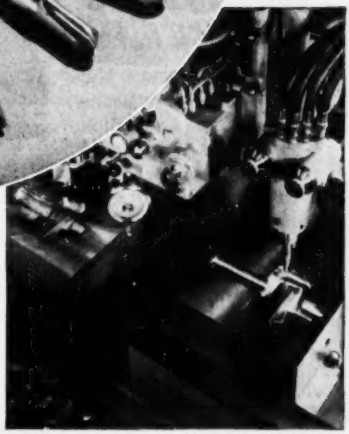
LARGEST SELLING CUTTERS FOR TOUGH DIE STEELS

You get more work between grinds . . . with these *extra rugged* T-J Die Sinking Milling Cutters. That's why they're top favorites in die and forge shops everywhere! T-J Cutters are correctly designed for speed, accuracy and long life . . . hold a sharp edge longer . . . less breakage! Made from an extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground. Wide range of styles and sizes to *reduce your die costs!* Send for new catalog 4-153. The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

RIVETORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS



T-J Cutter at work on a Cincinnati 16" Vertical Hydrotel, latest design Die Sinker. A cutter of the right design and heat treatment for this high speed work in tough die steels, making posible the maximum efficiency of these new machines.

Metal-Working News in Brief

Federal Products Corp., Providence 1, R. I., has opened a branch sales office in Wayne, Pennsylvania. Under the management of **John E. Laffey,** assisted by **Frank Pardee,** the new office will serve eastern Pennsylvania, southern New Jersey, Delaware, and Maryland, replacing **E. R. Glenn** who was the company's manufacturers' representative in that area for many years.

Clearing Machine Corp., Chicago, Ill., has announced the appointment of **Rudolph Winters** as superintendent of its Hamilton, Ohio, plant. Mr. Winters, who joined the firm in 1940, was formerly a foreman at Clearing's main plant in Chicago.

— o —

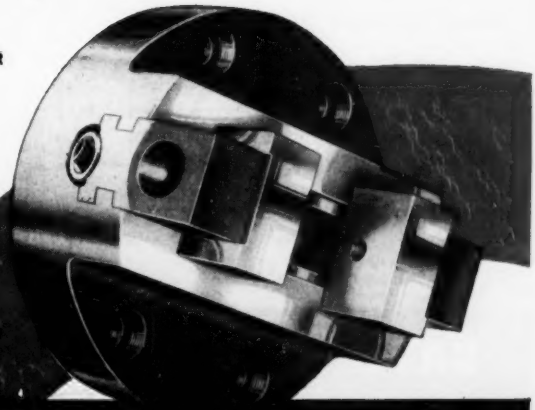
E. B. Meynard, sales manager, has been appointed general sales manager and **Robert V. Shaffer,** special field representative, has been named field sales manager by Buckeye Tools, Corp., Dayton 1, Ohio. In their new positions, Mr. Meynard will supervise all sales and promotion activities for the company and Mr. Shaffer will work as liaison between the home office of the company and field sales.

— o —

Barwood & Co., Philadelphia, Pa., has been named exclusive representative in Baltimore, Philadelphia, and Trenton, New Jersey, as well as the adjacent territories, for B. C. Ames Co., Waltham, Mass., manufacturer of micrometer dial gages, micrometer dial indicators, and a wide variety of accessories.

CAMPBELL Nibbling Machines
ACCO products
Model 2524
CAMPBELL
Nibbling Machine
How Cutting from a Template is Simplified with a CAMPBELL Nibbler
• With CAMPBELL Nibbling Machines the cut can be made in any direction without head adjustment. The operator can feed the work with both hands following a template clamped above the work.
These machines leave a relatively smooth edge, which requires little finishing. Various models cut all thicknesses of metal up to ½". Variable cutting speeds. Drive is completely enclosed for safety.
ACCO
CAMPBELL makes a complete line of Nibblers. Write for literature.
CAMPBELL MACHINE DIVISION
AMERICAN CHAIN & CABLE
931 Connecticut Ave., Bridgeport 2, Conn.
CAMPBELL
Abrasive Cutters and Nibblers
TRADE MARK

GOOD CHUCKS
keep your
machine tools
at PEAK EFFICIENCY



CUSHMAN

MANUALLY-OPERATED CHUCKS

No machine tool can perform better or maintain closer tolerances than the chucks with which it is equipped. That is the simple reason why we at Cushman emphasize PRECISION in every detail of our production. Experienced engineering, with years of work-holding "know-how," finest modern manufacturing equipment, and exceptional inspection and test procedures, stand back of Cushman Chuck performance.

Good chucks protect your investment in high production equipment... help maintain peak production... conserve skilled man-power. Specify Cushman... A WORLD STANDARD FOR PRECISION.

Cushman Manually Operated Chucks are described and listed in Catalog No. 65 . . . Cushman Air Chuck Catalog No. PO-64 lists separately our complete line of Air Chucks, Cylinders and Accessories.

Either or both will be sent on request.

THE CUSHMAN CHUCK COMPANY
818 WINDSOR STREET
HARTFORD 2, CONNECTICUT, U. S. A.
Chucking Engineers Since 1862

Manufacturers of

AIR CHUCKS, CYLINDERS, and ACCESSORY EQUIPMENT • THE CUSHMAN POWER WRENCH • CUSHMAN MANUALLY OPERATED CHUCKS and FACE PLATE JAWS.

A WORLD STANDARD FOR PRECISION

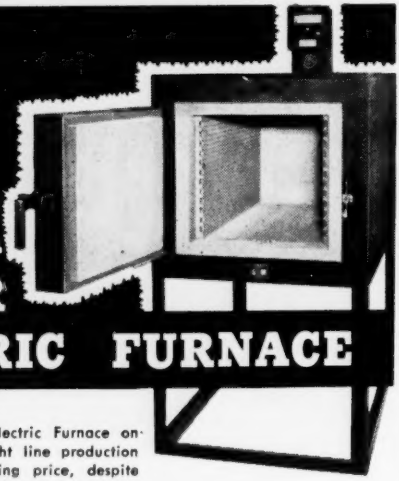
DCB88B

Metal-Working News in Brief

Donald I. Bohn, chief electrical engineer, and **Louis N. Grier,** assistant chief electrical engineer, have been named to new positions by Aluminum Company of America, Pittsburgh 19, Pa. Mr. Bonn will be in charge of special electrical development engineering work and Mr. Grier will assume the post of chief electrical engineer.

Hanson-Whitney Co., Hartford, Conn., has announced the appointment of **Ralph Edwards** as general sales manager of machine tools and **Edward P. Cody** as general sales manager of small tools and gages. Mr. Edwards was formerly New York branch manager for Keller Tool Co., Grand Haven, Mich. Mr. Cody has been associated with Hanson-Whitney since 1924 and was formerly sales manager.

SAVE 3 WAYS WITH A LUCIFER ELECTRIC FURNACE



1 SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace EVERY TIME.

2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed—Lucifer controls are EXACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed, long lived, trouble free. More than two thousand satisfied users.

CHECK THESE PRICES

Furnace Size	2000°	2300°
6x 6x12"	$467.00	$548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

WRITE FOR FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation. Write, wire or 'phone today.

LUCIFER FURNACES, INC.

Neshaminy 10, Pa. **Phone Hatboro 0411**

Successors to Gilbert S. Simonski Company

—o—

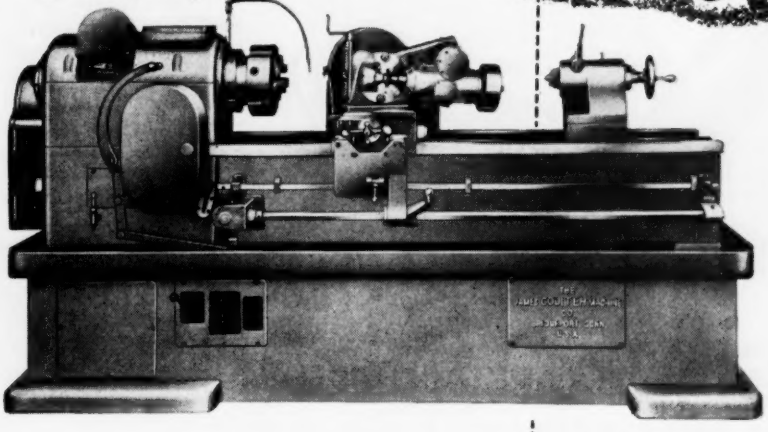
K. O. Lee Co., Aberdeen, S. D., has announced the appointment of **George F. Thompson** as western zone manager. Located at 830 Venice Blvd., Los Angeles, Calif., the western zone office and warehouse serves Arizona, California, Colorado, Nevada, New Mexico, and Utah.

—o—

Crucible Steel Company of America has announced the appointment of **Lawton Howell** as works controller at its Sanderson-Halcomb Works in Syracuse, N. Y. **F. W. Bloom** will succeed Mr. Howell as cost accountant at the company's Midland Works.

FASTER AUTOMATIC PRECISION THREADING

The only answer to high cost production blues!



Get set to sing a happy tune, for COULTER can help you banish those *"labor shortage/reject/poor production of threaded part/blues"*.

The COULTER "Threadmaster" (shown above) is one thread milling machine that can produce long and short precision traversing, elevating, crossfeed and lead screws in less time with uncanny accuracy.

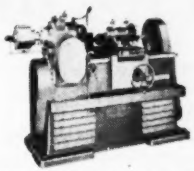
Investigate COULTER AUTOMATIC THREADING MACHINES today — change the "blues" to "cheers" — extract *every cent of profit* possible out of your plant and still maintain the high quality standards you demand.

IF YOU ARE CONFRONTED with a thread production problem, our engineers can help you. Literature available.

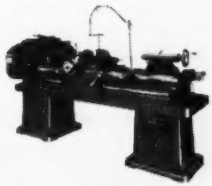
MACHINE TOOL BUILDERS SINCE 1896

The James Coulter Machine Co.

641 Railroad Ave. **Bridgeport 5, Conn.**



Model "H1" COULTER HOB THREADING MACHINE produces internal, external, right and left hand threads with precision — Faster — Accurately — AUTOMATICALLY.



Model "L1" COULTER THREADING LATHE produces precision, square, standard and 29 degree internal or external threads in various diameters and materials — Faster — Accurately — AUTOMATICALLY.

Metal-Working News in Brief

Canute R. Olsen has been appointed manager of the general sales staff of United States Steel Supply Division of U. S. Steel Corp., Chicago, Ill., succeeding **Harold A. Miller** who has joined the Isthmian Steamship Co., New York, as personnel manager. Mr. Olsen was formerly manager of the market development division.

Robert S. Sagers has been appointed manager of the New England district by Kennametal Inc., Latrobe, Pa. Mr. Sager was formerly service and sales representative in the Middle Atlantic district.

—o—

Farrel-Birmingham Co., Inc., Ansonia, Conn., has announced the appointment of **Robert C. Brady** as New York office manager, succeeding **Carlter Weele** who has left the company. Mr. Brady joined the company in 1949.

—o—

The du Mont Corp., Greenfield, Mass., has announced the appointment of **Electrolizing Sales & Tools, Inc.,** 1406 E. 15th St., Los Angeles 21, Calif., as distributor for its line of du Most High-Speed Ground Tool Bits.

—o—

Supreme Products, Inc., Chicago, Ill., has announced the appointment of **Robert Lowell** as eastern sales manager with headquarters in New York City. In his new position, Mr. Lowell will direct and supervise all Supreme salesmen in the eastern area.

Slashes Costs On Reaming Jobs

Staples CARBIDE-TIPPED SHELL TYPE EXPANSION REAMER *

Here's how you can triple your tool life on all types of line and piloted reaming jobs—use Staples Shell Type Expansion Reamers. To compensate for wear, reamer shell expands to original diameter by driving it up the tapered arbor. Re-expand shell until maximum carbide utility is reached. A new tool is obtained simply by replacing the worn shell—a standard item. Many design variations of this tool are possible, including use of two shells of different diameters for step reaming.

For maximum tool economy, specify Staples Carbide-Tipped Circular Tools for reaming, core drilling, spotfacing, counterboring and end milling jobs. Quick delivery of standard tools from stock. Special tools designed to your requirements. Write for tool catalog.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio
Distributors in Major Cities
Staples CARBIDE-TIPPED CUTTING TOOLS
A complete line of Circular Carbide Tipped Cutting Tools
Expansion Reamers Special Tools

CONSULT **P-S** FOR THE BEST

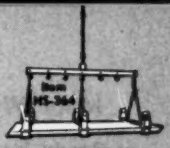
Materials Handling Equipment

Item B-218

WELDER'S TRUCK

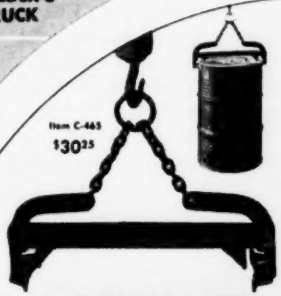
Item B-470

BARREL and BOX SKID



Item HS-364

SHEET STEEL GRAB

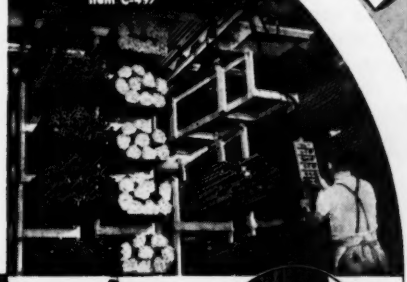


Item C-465 $30.25

***Vertical* DRUM LIFTER**

For handling open and closed steel drums in vertical position, by crane or hoist. All-steel, with heavily welded chain. Sure-hold safety barrel grip. Saves plant space. Use for either high or low ceiling condition.

PORTABLE
Heavy Duty
BAR RACKS
Any Rack Easily Accessible
Item C-497



Item B-205

Item B-539

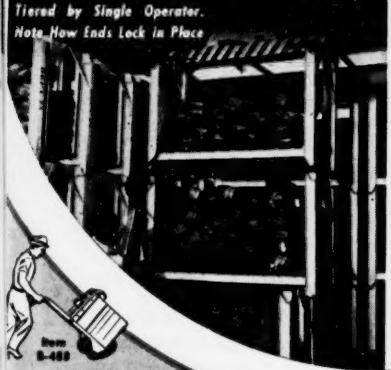
All metal PALLET

Item 30975

AIR SAVER leak proof **AIR VALVE**

STACKING RACK Item C-496

Tiered by Single Operator. Note How Ends Lock in Place



Item B-489

CARBOY TRUCK

Item B-731 $181.50

DRUM and BARREL TILT

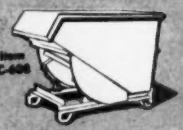
A barrel tilt for controlled, precision dumping or pouring. Ideal for chemicals, solvents, powders, etc. Turns 360° through worm drive. Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive.

Item HS-249

WOOD BOX metal bound

Item S-703

Industrial DUST PAN



Item C-606

Automatic END DUMP

Item S-918

CORE RACK

Item HS-415

UTILITIES RACK on wheels

Item D-28 (Box)

Item C-451 (Stand)

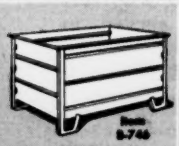
Sloped Bottom BOX and STAND

Item S-911

BARREL TRUCK loads automatically

Item B-391

MULTI-PURPOSE CART



Item B-746

CORRUGATED BOX with legs

Item B-300

TRAILER TRUCK side dump

WHEN ORDERING always give "Item" number. **ALL PRICES** are f. o. b. Detroit. Prices are subject to change without notice. Write for Catalog.

DESIGNED AND MANUFACTURED BY

Palmer-Shile Co.

16022 FULLERTON AVE., DETROIT 27, MICH.

Metal-Working News in Brief

Ready Tool Co., Bridgeport, Conn., has announced the appointment of **Di Eugenio Tool Center,** 119 S. Eleventh Ave., Phoenix, Ariz., as exclusive sales engineer for the states of Arizona, New Mexico, and Colorado.

— o —

Morey Machinery Co., Inc., New York 13, N. Y., has announced the addition of **Fred A. Milnes** to its staff to head the enlarged division of presses and related machinery. Mr. Milnes was formerly associated with E. W. Bliss Company where he was a sales engineer and export sales manager.

— o —

American Gas Furnace Co., Elizabeth, N. J., has granted additional territory in New York State to its southeastern New York representative, **Hornbruch Associates,** Scotch Plains, N. J. The new territory will extend from Glen Falls through metropolitan New York.

— o —

Norton Co., Worcester, Mass., has announced the appointment of **David B. Tyler** to handle advertising of its precision grinding and lapping machines, refractory and boron carbide products. **Clifford S. Duxbury, Jr.,** will direct all of the company's export advertising.

— o —

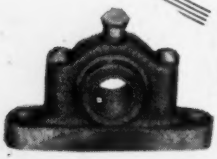
M. W. Townsend, sales manager, has been appointed assistant to the president of Handy & Harman, New York 38, N. Y. Mr. Townsend is succeeded as sales manager by **Paul G. Feld** who formerly served in the capacity of assistant to the sales manager.

For "On the Spot" DELIVERY ... from STOCK

Chicago PILLOW BLOCKS

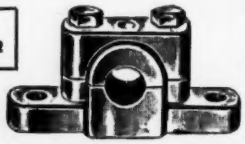
BALL BEARING
(SELF-ALIGNING—PRECISION GROUND)
Sizes from ½" to ¾".

WRITE FOR CATALOG No. 8952



BRONZE BEARING
(SELF-ALIGNING—SPLIT)
Sizes from ½" to 1"

JOURNAL
(SOLID-BABBITT)
Sizes from ⅜" to ¾"



BABBITT BEARING
(SPLIT)
Sizes from ½" to 1¼"

MFG'D BY
Chicago DIE CASTING MFG. CO.
2310-14 WEST MONROE STREET
CHICAGO 12, ILLINOIS

The right combination counts ... in grinding wheels too!

SIMONDS ABRASIVE CO.

Grinding Wheels

Simonds grinding wheels have the right combination to put *you* in the 'chips' . . . the quality controlled combination of grain size and bond strength to stack up production . . . the sure combination for economical grinding, fast stock removal and long wheel life. Complete line includes everything for roughing, finishing, cutting off, polishing and sharpening. Whether *you* need grinding wheels, mounted wheels and points, segments or abrasive grain . . . you'll find Simonds your best deal for best results.

Write for free data book and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y. Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

Metal-Working News in Brief

The promotion of **E. G. Brown, Jr.**, to factory sales representative has been announced by J. H. Williams & Co., Buffalo, N. Y. In his new position, Mr. Brown will cover eastern and southwestern Pennsylvania and Maryland, with the exception of Baltimore.

— o —

Kenneth E. Knotts, formerly sales manager of Valvair Corporation, has been made district sales representative for C. A. Norgren Company in metropolitan New York and northern New Jersey. Mr. Knotts will make his headquarters at 106 Miln St., Cranford, New Jersey.

— o —

Firth Sterling Inc., Pittsburgh 30, Pa., has announced the appointment of **Robert E. Kimmins** as assistant to the steel sales manager. In this capacity, Mr. Kimmins will take over the responsibilities of the company's high-temperature alloy steels.

— o —

Harry D. Temporal, manager of the Chicago branch office of Farrel - Birmingham Co., Inc., Ansonia, Conn., has retired, terminating 43 years of employment with the company. Mr. Temporal has been succeeded by **Gerald R. Gonyer** who has been serving as his assistant.

— o —

Houghton Laboratories, Inc., Olean, N. Y., has announced the appointment of **Servisales** Co., 14327 Detroit Ave., Cleveland, Ohio, and **John S. Plewes Co.**, 52 Humbercrest Blvd., Toronto, Canada, as Houghton representatives in Ohio and Canada, respectively.

HARDNESS CONVERSION CHART

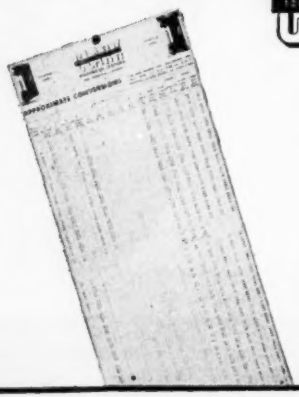
For Every Shop That Does Hardness Testing

This latest and most nearly accurate Hardness Conversion Chart is a necessity wherever hardness testing is done. It has been compiled and produced by CLARK, makers of the internationally respected CLARK Hardness Tester for "Rockwell Testing." Printed on heavy stock convenient for wall mounting, the chart is offered **free of charge** to hardness tester users. Just attach this ad to your letterhead or write "Send wall chart." A copy will be mailed to you without charge or obligation.

P.S. If you would also like information on CLARK Standard and Superficial Hardness Testers, we'll be glad to send that along too.

CLARK

TOMORROW'S ACCURACY TODAY



CLARK INSTRUMENT INC.
10204 Ford Road
Dearborn, Mich.
U.S.A.

Cutting hydraulic maintenance on **operation big squeeze!**

● Shown above is one of the world's largest injection molding machines.

The General Machine Tool And Die Company, pioneer of the injection molding process of plastic forming, uses the new giant injection machine to produce refrigerator door panels. Forming one entire panel per injection, this Operation "Big Squeeze" pioneers another important advance in injection molding.

In the hydraulic system of this great machine, as in ten other injection presses operated by this Company, STANOIL has played a significant role. Withstanding severe conditions of heat and pressure, STANOIL has kept hydraulic systems clean and permitted efficient operation of units at all times. Maintenance has been kept to a minimum.

Find how STANOIL can benefit you by discussing this multi-purpose oil with the Standard Oil lubrication specialist serving your section of the Midwest. Phone your local Standard Oil office. Or, write: Standard Oil Company, 910 South Michigan Ave., Chicago 80, Ill.

STANDARD OIL COMPANY
(Indiana)

STANDARD

Metal-Working News in Brief

Allied Products Corp., Detroit, Mich., has announced that **Warner J. Canto** has joined its accounting department staff. Mr. Canto's initial assignment is to reorganize the accounting methods and procedure of Michigan Powdered Metal Products Company, Inc., a wholly-owned Allied subsidiary located in Northville, Michigan.

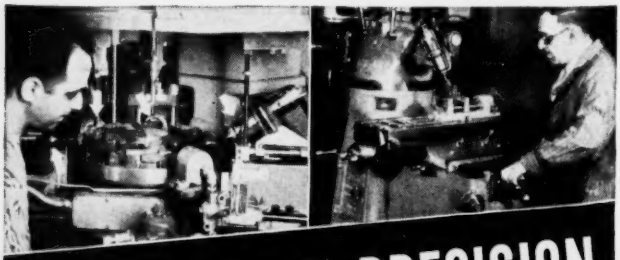
Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of **W. M. Truska, Jr.,** as European sales representative for its new manufacturing center in the Netherlands; namely, Hydraulische Pers Maatschappij Nederland, N. V. Officers of the new corporation are **G. B. Robinson,** chairman of the board; **John C. Cotner,** president; **John M. Dolan,** vice president; and **George A. Daniels,** secretary-treasurer.

— o —

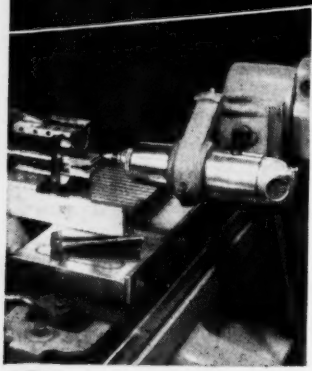
U. S. Steel Supply Division of United States Steel Corp., Chicago 90, Ill., has announced the appointment of **Raymond E. Rowton** as assistant treasurer in the Chicago General office and **Warren W. Goodwin** as credit manager, Chicago district, succeeding Mr. Rowton.

— o —

Scully-Jones & Co., Chicago, Ill., has expanded manufacturing facilities to meet an increased demand for "Roll-Lock" chucking tools, which include mandrels, arbors, and chucks to provide a powerful and extremely accurate hold or centering fit for precision work.



LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



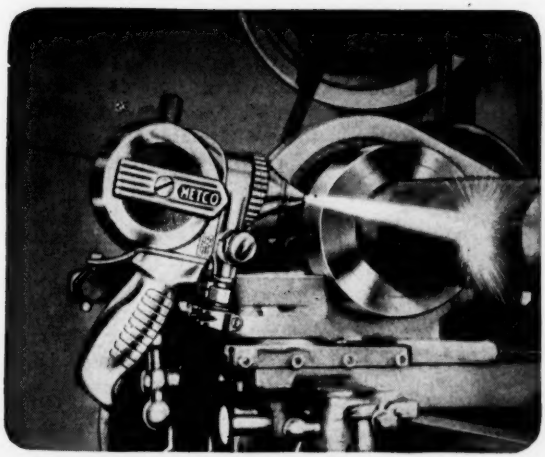
ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¾ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters.* PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.

Write FOR NEW CATALOG

PRECISE PRODUCTS CORP., 1345 Clark St., Racine, Wis.

Precise GRINDER-MILLERS



now a really low-cost metallizing installation...

with the new Metco L-Gun

Metallizing damaged journals on turbine shaft

Building up worn brake-drum

Metallizing protective coating on steel plate

New, low, compressed-air requirements . . . only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor . . . bring metallizing within reach of the small user.

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
- Do your own hard-facing,
- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

Sprays 23 Different Metallizing Wires—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

It's Versatile—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.*

Same High Quality as Other Metco Guns—The low air requirements of the new L-Gun have been achieved without any sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

A Real Opportunity for the Smaller Shop—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.

See other examples of metallizing illustrated in our 8-page Bulletin in your Sweet's Plant Engineering File—Section 7a/Me.

The following names are the property of Metallizing Engineering Co., Inc.

METCOT • Sprabond wire • Metco-Weld

†REG. U. S. PAT. OFF.

METALLIZING ENGINEERING CO., INC.

38-14 30th STREET LONG ISLAND CITY 1, N. Y.

In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD. Chubham near Woking, England

Don B. Watson
METALLIZING ENGINEERING CO., INC.
38-14 30th Street Long Island City, New York

☐ Please send me more information about metallizing.
☐ Please arrange a demonstration in my shop.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

Metal-Working News in Brief

E. W. Bliss Co., Canton, Ohio, has announced that **Howard U. Herrick,** president of the company, has entered into an agreement extending his services with the company as a senior executive officer for a period of three years. Hr. Herrick, having been with the company as executive vice president from 1934 to 1944, rejoined the firm as president in 1951.

Frostrode Division of Viking Products has announced the transfer of the Frostrode sales, special engineering, and new development departments to 3066 E. Outer Drive, Detroit 34, Mich. **Parke Kinietz,** sales manager, states that the move will enable the company to better serve its customers in that area.

—o—

Ed Kelly, for 23 years associated with Greenlee Bros. & Co., Rockford, Ill., and sales manager of the screw machine department since 1943, has retired. Mr. Kelly will be succeeded by **Harold V. Bailey** who has been with the company for 20 years and who has been serving as assistant sales manager of the screw machine department.

—o—

Progressive Welder Sales Co., Detroit, Mich., has announced the appointment of **William F. Tingler** as director of advertising and sales promotion. **Lester J. Blackford** has been named sales manager and **Earl A. Goyeau** has been appointed as assistant manager of the Viking Division of the company.

Your Entire Stock of Drills...
Seen at a glance
HUOT DRILL DISPENSER
for
• TOOL CRIBS • STOCK ROOMS • MACHINE SHOPS
Saves Time hunting through stacks of packaged drills. Compartments hold a gross of small sizes—a dozen or more of the larger ones. Raised letters on easy sliding drawers . . . hammerlin gray baked enamel finish . . . 14½"x7¼"x7¼".
Write for Circular
Model No. 1: Fractional drills 1/16" to 1/2"
Model No. 2: Number drills 1 to 60
Model No. 3: Letter drills A to Z
HUOT MFG. CO.
538 NORTH WHEELER ST.
ST. PAUL 4, MINNESOTA
"HUOT" is pronounced "HEW-OT"

RODDICK *self-releasing* TAP HOLDER *with* BALL-ACTION CLUTCH

Assures:

- Accuracy
- Safety
- Minimum wear
- No hammering of clutch

Taps can be changed in a few seconds, in two operations—
no bushings required
Right or left hand tapping
Can be used on rotating or non-rotating positions
Floats tap into hole
3/32" length of pull-out to release
Uniform depth of thread regardless of feed
Solid shanks for strength
Floating back jaws compensate for off-center tap squares
Threading operation can stop and start at any point
without difficulty or shock

Send for leaflet giving more detailed information about this incomparable tool which incorporates a revolutionary principle that will speed production and produce better work.

8776 GRINNELL AVE. **EMPIRE TOOL COMPANY** **DETROIT 13, MICHIGAN**

Why accept this?...

when you actually want this?...

CARMET *blanks are preformed to your order!*

ATTENTION INDUSTRIAL DISTRIBUTORS:

Ask us about handling CARMET standard tools and blanks in your area. Some territories are open. Write, phone, or wire.

ADDRESS DEPT. MS-45

Above are shown two carbide metal rolls of identical composition. The one at the left cost the user about nine times as much as the one at the right. That differential was due solely to grinding vs. non-grinding. The plain face needed serrating, whereas the ready-toothed face needed nothing.

In many uses where tolerances are not too critical, CARMET blanks *preformed* to your specifications are ready for service without additional costly grinding. On jobs where finish grinding is necessary, the quality of Carmet's preforming holds grinding stock to a minimum.

Hundreds of special shapes can be preformed in Carmet. For practical suggestions that fit your needs, call or write your nearest A-L representative. ● *Allegheny Ludlum Steel Corporation, Carmet Division, Wanda & Jarvis Avenues, Detroit 20, Michigan.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

W&D 4048

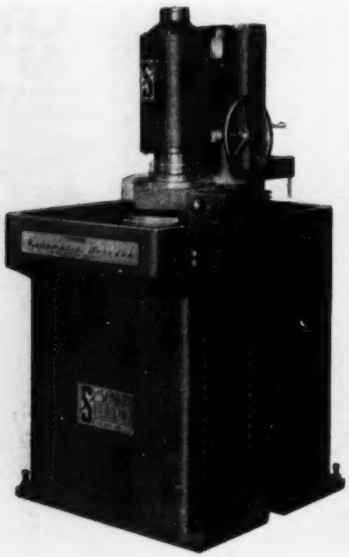
AL
FINE TOOL STEELS
SINCE 1854

new shop equipment

Surface Grinder Is Hydraulically and Electrically Controlled

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, has announced that its "Rotamatic" Surface Grinder is now available in 10, 12, 14, 16, and 18-inch models. The completely automatic high-production machine is hydraulically and electrically controlled for a complete grinding cycle with automatic stop. The switch panel of the grinder includes a start button, with a separate optional control of the grinder spindle, work spindle, and coolant pump, and optional energizing of the magnetic chuck for wheel dressing.

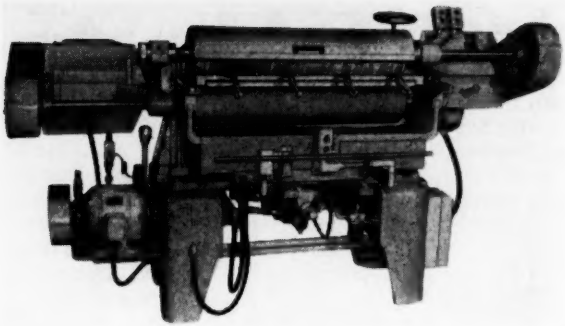
The machine is equipped with either a Standard 7½-h.p. or 10-h.p. precision motorized grinding spindle having heavy end thrust construction. Arranged for Type 2 (cylinder type) steel-back grinding wheel or segmental wheel chuck, the machine also incorporates a structural plate steel grinding wheel guard, a graduated handwheel for independent vertical adjustment, and a grinder head actuated on hydraulic life-type column with neoprene bellows protection.



Standard "Rotamatic" Surface Grinder

Machine Provides for Any Degree of Finish

Designated as the Model 202-A, a double-roll surface finishing machine which is designed to provide for any degree of finish from flash removal to mirror finish has been announced by Clair Mfg. Co., Inc., 1032 S. Union St.,



Clair Model 202-A Surface Finishing Machine

The rolls are 40 inches wide, with diameters ranging from 4 to 9 inches. The rolls, it is claimed, can be replaced in less than two minutes, thus permitting rapid change-over of operation.

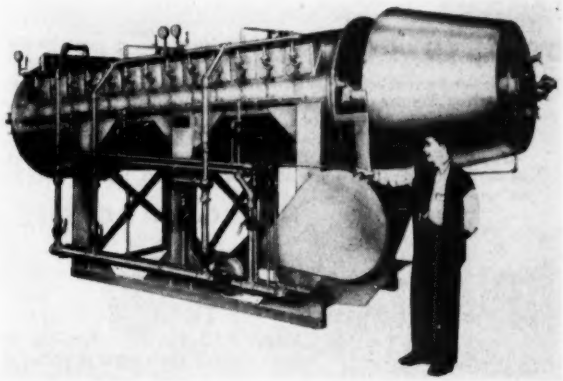
Olean, N. Y. The machine, it is claimed, is ideal for finishing faces of either open end or adjustable wrenches, wrench handles, wood chisels or cold chisels, cutlery blades and handles, and surgical instruments.

With its two-directional electro-hydraulic feed mechanism, the machine features a straight-line actuation principle which is said to eliminate all rapidly wearing parts, such as cams, gears, worms, levers, ratchets, and so on. According to the manufacturer, the totally-enclosed hydraulic circuits and sealed anti-friction bearings used throughout the machine are not vulnerable to abrasives and remain free of lost motion.

An enclosed compressed air circuit opens and closes the rolls for unloading and also provides automatic float for the rolls as they follow the geometry of contoured work at any predetermined uniform pressure. Incorporated in the air circuit is a safety bar which causes the rolls to fly apart even at light body pressure,

Rotary Retort Furnace Has Three Separate Zones of Temperature Control

Designated as the Model 139DR, a rotary retort furnace which features three separate zones of temperature control has been announced by American Gas Furnace Co., 976 Lafayette St., Elizabeth, N. J. External controls are said to permit the operator to regulate the temperature in any one of the three zones which are divided about equally over the length of the furnace. The furnace is provided with a pilot light at each burner, thus making the furnace easy to light, minimizing the danger of unlighted burners, and enabling the operator to complete his furnace inspection at a glance.



AGF Model 139DR Rotary Retort Furnace

The heated work space measures 15 inches in diameter x 10 feet in length. According to the manufacturer, the production of non-ferrous metal parts is 1,000 lb. per hour which can be regulated through the self-metering hopper and the variable speed of rotation, and the weight is variable to suit the temperature requirement. The overall size of the furnace is 16 feet long x 7½ feet high x 4½ feet deep.

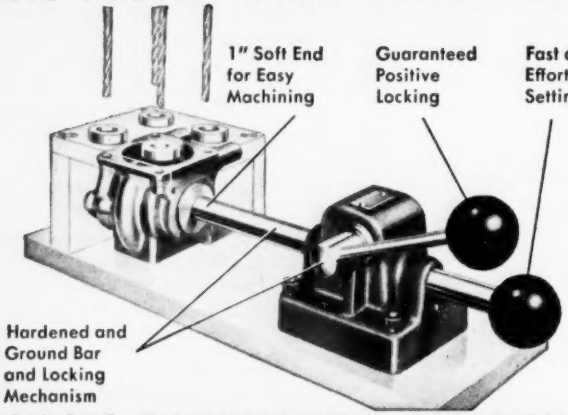
Water-Soluble Phosphorus Compound for Production Machining and Grinding

Designated as Tuff-Kut 77, a water-soluble phosphorous compound which is said to be designed for all types of production machining and grinding operations wherever a water-type compound is desirable has been announced by Lubricants, Inc., 1320 Oakman Blvd., Detroit 6, Michigan.

The compound is claimed to be non-corrosive, non-toxic, stable, and unaffected by either acid or alkalinity. Tuff-Kut 77, it is further claimed, is a true emulsion rather than a dispersion.

According to the manufacturer, the compound is ideal for use as a broaching lubricant for both horizontal and vertical-type broaching operations. The usual concentration recommended for horizontal broaching operations is eight to 10 parts water to one part Tuff-Kut 77, whereas a concentration of 25 to 30 parts water to one of the compound is recommended for vertical-type broaching operations.

HEINRICH "GRIP-MASTER"
FIXTURE LOCK
CUTS TOOLING COSTS—SPEEDS WORK


1" Soft End for Easy Machining
Guaranteed Positive Locking
Fast and Effortless Setting
Hardened and Ground Bar and Locking Mechanism

BOOSTS PRODUCTION, EFFICIENCY

Now—at the request of industry—we offer the new "Grip-Master" Screwless Fixture Lock, applicable for fixtures and jigs used in drilling, milling operations, etc. It incorporates the same high-quality locking mechanism proved by industrial use in the famous "Grip-Master" Screwless Drill Press Vise. Pays for itself quickly by increasing production, cutting tooling costs, etc. See your Dealer, or write for details.

heinrich TOOLS INC.
Formerly National Machine Tool Co.

NEW CATALOG FREE
Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.

Dept. 113-J Racine, Wisconsin
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SHELDON

CHICAGO U. S. A.

More will be *profit* with a SHELDON

It actually costs less to do most turning jobs on a Sheldon Precision Lathe. Machine-tool investment is cut to a fraction. Power cost is materially reduced. Less experienced operators can operate Sheldons safely and efficiently. Even cost-loadings for plant—floor space, heat and light are lower because two Sheldons can often operate in the space occupied by one large lathe.

On most "everyday" jobs a Sheldon will actually turn out more pieces per hour too. With double V-belts to the spindle Sheldon lathes deliver enough power to take a healthy bite in direct drive, at really high speeds. Sheldon's "Zero Precision" Taper Roller Bearings permit work to the closest tolerances. Very seldom if ever are such extremely accurate bearings used in other lathes.

You will actually keep more as profit if you use Sheldon Lathes wherever possible.

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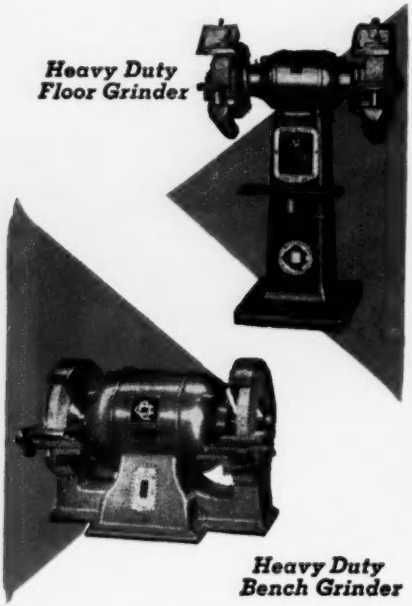
SHELDON MACHINE CO., Inc. 4250 North Knox Ave., Chicago 41, Illinois

"Time Savers in any shop"



Heavy Duty Floor Grinder

Heavy Duty Bench Grinder

Here's extra value in long life, low maintenance and low first cost. QUEEN CITY Bench and Floor Grinders and Buffers have all the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models . . . all priced far below comparable grinders and buffers.

QUEEN CITY MACHINE TOOL CO

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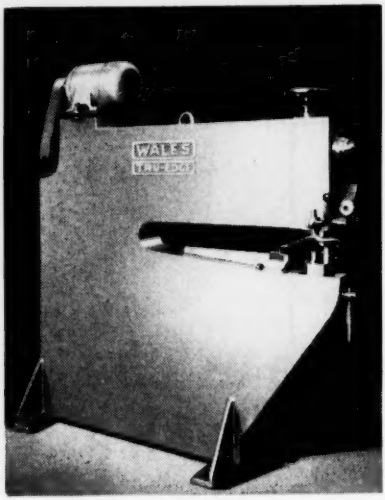
3911 Kellogg Avenue, Cincinnati 2, Ohio

Giant Model Shear Is Designed for Contour and Straight Inside and Outside Shearing

The Wales Giant Model Tru-Edge Shear announced by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., is designed for contour and straight inside and outside shearing, beading, louvering, and joggling. It has a capacity for up to 9/32-inch thick mild steel. A new shearing principle is



Wales Giant Model Tru-Edge Shear

said to eliminate resistance to feeding and turning the work. In addition, feeding of material may be started while the ram is operating. Inside cutting requires no starting holes, entirely eliminating any preliminary operations.

A unique cam design is said to provide for vibrationless operation. An adjustable bottom shearing die is quickly set for various thicknesses of material. The shear is claimed to cut from 10 to 36 feet per minute, depending on the gauge and material. Throat depth is 36½ inches.

HERE'S THE

"tap miser"

YOU'VE BEEN WAITING FOR!

HELPS ELIMINATE COSTLY TAP BREAKAGE SHUT-DOWNS and EXCESSIVE WORK SPOILAGE!

Breaking too many taps?—Tap life shortened?—Spoiling many pieces?—Then check your tapping equipment. Investigate PROCUNIER Tapping attachments. Whether it's continuous or intermittent tapping in soft or hard metals—large or small hole jobs with skilled or unskilled operators—you will find Procunier Tapping machines performing with a new-found ease, a more dependable and consistent accuracy and providing many extra hours of tapping efficiency. Procunier Tappers are gentle to costly taps and tough on maintaining production schedules.

There are many reasons for this Procunier superiority—Procunier Tappers include: cover clamping and quill models which mount rigidly eliminating chatter and vibration; new, sensitive double-cone friction clutch automatically regulates driving pressure with a soft "cushioned" action; simple, one shot lubrication, ballbearing equipped; heat treated gears with special gear reversing mechanisms; unique tap holding spindle support; aluminum housing; plus other important features.

Write for FREE Circular

giving complete details and specifications on the complete line of Procunier Tapping Heads.

PROCUNIER SAFETY CHUCK CO.
12 S. Clinton St., Chicago 6, Ill. Dept. 9

Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

Name .....

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with the new "TRU-GRIP" tap holder

The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

Procunier

Safety Chuck Company

12 S. CLINTON ST., CHICAGO 6, ILL.

Certified Thread Gage Inspection Service

Quality Control Corp., 401 Broadway, New York 13, N. Y., is now offering a certified thread gage inspection service whereby thread plug gages are checked to determine the wear in the pitch diameter to 0.00005 inch, the lead error to 0.0001 inch, the angle to 2 to 8 minutes depending on the pitch, major diameter to 0.0002 inch, minor diameter to 0.0002 inch, and thread form as to clearance. Thread ring gages are checked to determine the angle to 5 to 10 minutes depending on the pitch, lead error to 0.0001 inch, minor diameter to 0.0002 inch, thread form as to clearance, fit on a master setting plug, and if they are within the tolerance of current government specifications. Inspections are performed in a modernly-equipped air-conditioned room where the temperature is held constant at all times.

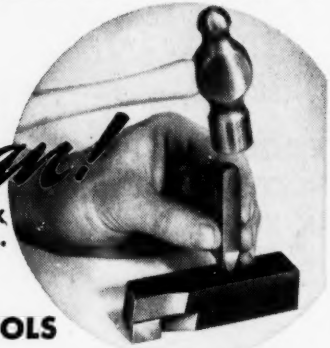
The company also has an efficient indicator repair department for rebuilding indicators and indicating gages. The indicators are disassembled and cleaned, and all worn and broken parts are replaced. The indicators are tested for accuracy with a micrometer calibrating machine to determine the error in each graduation on the dial upto 2½ revolutions of the hand and to also check the spring tension at the contact point of the indicator.

A GOOD NAME ON A GOOD PRODUCT

IS YOUR BEST

Salesman!

HERE'S HOW YOU CAN MARK YOUR PRODUCT BETTER . . . with Parker MARKING TOOLS



To stamp your name or trademark cleanly, permanently—and do it in less time, at less cost with a Parker hand stamp or press marking tool—is profitable, sound business. Trademarks and legends can be exactingly duplicated, enlarged or reduced from your drawings by Parker craftsmen. To make a lasting impression—to sell more products to more prospects—be sure to specify Parker steel marking tools.

34 PAGE CATALOG 'Marking Tools by Parker' sent on request!

THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
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DRILL SLEEVE
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No matter what your tool requirements may be – no matter how often tools must be changed–Beaver Quick-Change Tool Holders and Adaptors will save you money.
Less than ten seconds per tool change and no loss of accuracy gives you maximum production from each machine.
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Tooling can be installed
on most standard machines.
Let us show you how it will
benefit YOUR machine operations.
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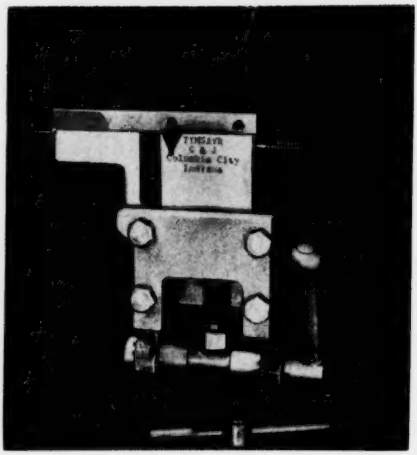
BEAVER TOOLS
ARE WORKIN' FOOLS!

Cross Drill Fixture

Designated as the "Tymsavr," a cross drill fixture which, it is claimed, can be quickly and securely clamped to the swing table of an ordinary drill press, thus providing a quick and standard setup for most production cross drilling operations, has been announced by C & J Screw Machine Products, Inc., 445 S. Line St., Columbia City, Ind. The fixture has two drill hole positions in the bushing plate which accommodate standard harden-



C & J "Tymsavr" Cross Drill Fixture

ed drill bushings. The bushings are interchangeable up to $\frac{3}{8}$-inch drill hole size.

An adjustable end stop is said to accurately position the work lengthwise, and its move-back range allows holes to be drilled as far back as $1\frac{7}{8}$ inches from the end of the workpiece. Extra-long pieces to be drilled can be placed crosswise in a special vee channel cut across the regular V-block.

The fixture is said to be capable of handling stock from $\frac{3}{16}$ to 1 inch in diameter, and the V-blocks are interchangeable to allow setups for production drilling of hex, flat, square, or irregular-shaped stock.

Make 3 hammers AT ONCE!

It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold

COMPLETE LEAD HAMMER SERVICE

Write for circular and prices

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67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

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T-BOLTS

BOLSTER & T-SLOT TYPES to J. I. C. press room standards

Forged, precision machined heat treated. Tensile strength 150,000 lbs.

SIZES

BOLSTER BOLTS — dia. to 1½" Heads sq. to 3" hex. to 2⅜" T-Slot bolts, ½", ⅝", ¾" dia. lengths to 12". 1" dia. 4" to 22" long.

NUTS — hardened — threaded to close fit. WASHERS — hardened — ground both sides.

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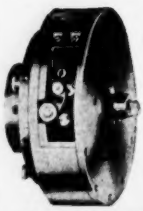

M-D Facing Heads

With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

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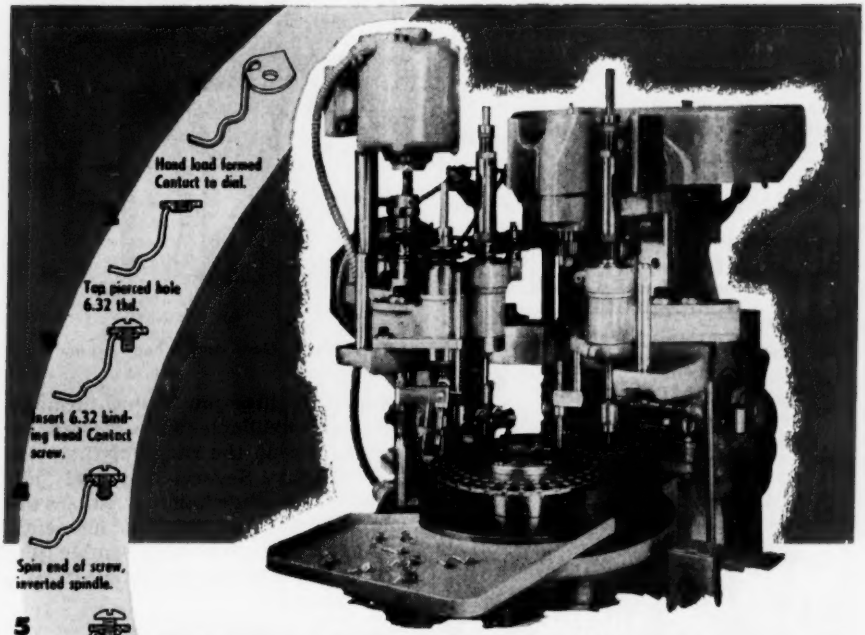
Bodine CASE HISTORY NO. 35


Hand load formed Contact to dial.
Tap pierced hole 6.32 thd.
Insert 6.32 binding head Contact screw.
Spin end of screw, inverted spindle.
5
Back up Contact screw.
6
Ejection is accomplished by contact on the backed up screw, thus giving automatic inspection for perfect work.

PRODUCING FLUORESCENT TUBE SOCKET CONTACTS

Bodine No. 40-10 Dial Type Tapping and Screw Inserting machine (all safety guards removed) tooled for production of Fluorescent Tube Contacts. Production rate, 60 pieces per minute.

Bodine multiple spindle automatics lead the field in high speed repetitive production of small parts. If your needs involve drilling, tapping, milling, screw inserting, staking and assembly operations . . . there's a Bodine model we can tool to handle several or all of them on one machine. Ask us for case histories showing what we have done to cut costs of accurate quantity production.

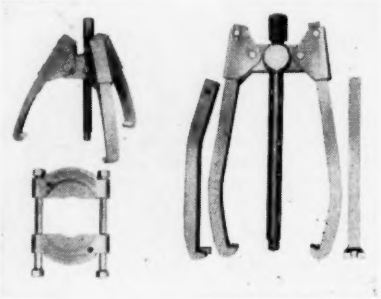
"You Can't Meet Tomorrow's Competition With Yesterday's Machine Tools."

THE Bodine CORPORATION
BRIDGEPORT CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING MILLING TAPPING AND SCREW INSERTING MACHINES

28D53

Gear and Wheel Pullers Provide Proper Maintenance of Equipment

J. H. Williams & Co., 534 Vulcan St., Buffalo 7, N. Y., has announced a line of gear and wheel pullers for the proper maintenance of industrial equipment, automobiles, trucks, aircraft, and farm and highway equipment. Jaws and blocks are forged from selected steel and heat treated for extra strength and safety. Jaw clips are self-adjusting, and forcing screws are made of high quality alloy steel which is heat treated. The new "unified" thread is utilized on screws and blocks.



Williams Gear and Wheel Pullers

Two and three-jaw styles, in many sizes, are available with changeable jaws to extend the range of their use and capacity. Several styles of "all-purpose" and slide hammer pullers are equipped with various attachments, making it possible to assemble just the right puller to meet a specific requirement.

Universal Machine Is Capable of Performing over 50 Operations

Designated as the "Rindis" Model EF.52/12, a universal machine which, it is claimed, is capable of performing over 50 different operations, including grinding, milling, sawing, turning,

Sid Tool Company

WHY WAIT FOR SPECIAL TAPS?

. . . Has them IN STOCK for IMMEDIATE DELIVERY!

HIGH SPEED | SPECIAL | RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40
3/8	12-16-18-20-27-28-32-36-40-48

SIZE	THREAD
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24

SIZE	THREAD
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32

SIZE	THREAD
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18

SIZE	THREAD
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

- **SPECIAL AND LEFT HAND DIES IN STOCK**

Prices on Application—We are always adding new sizes

NOTE: Oversize—Undersize—Metric—64th—and 32nd Size Taps Available for Quick Delivery.

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SID TOOL COMPANY, INC.

CUTTING TOOL SPECIALISTS

120 LAFAYETTE STREET • NEW YORK 13, N. Y.

PHONE: BE 3-4270

• Adjustable to 0.0002-inch, the new improved MASTUR boring tools feature precision, speed and long service life. New body and block construction permits these tools to take heavier cuts at higher speeds — to do more work in less time.

Adjusting-screw head is graduated into 50 divisions to provide readings in thousandths, and body is graduated to permit vernier readings of 0.0002-inch. The three models available have maximum boring bar capacities of 1/2, 3/4 and 1-inch and boring range from 3/8 to 15 inches.

988-MC

Write for catalog.

THE MAXWELL COMPANY

325 Broadway • Bedford, Ohio

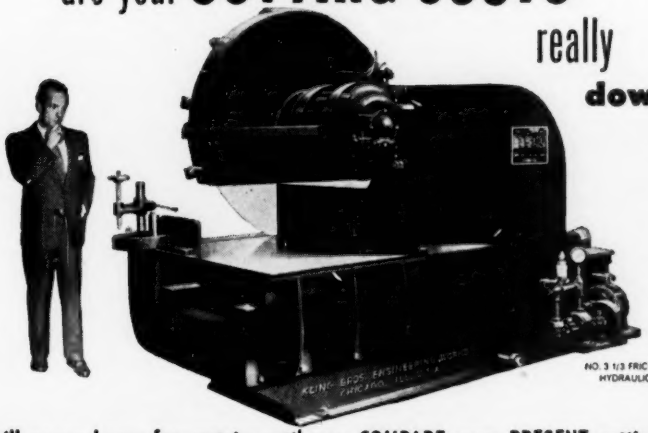
boring, drilling, filing, and many others, has been announced by Newage International, Inc., 235 E. 42nd St., New York 17, N. Y. According to the manufacturer, simple construction and a wide variety of attachments enable the machine to perform almost any precision machining operation rapidly and economically.

The basic unit of the machine is universal insofar as it is said to produce

Newage "Rindis" Model EF.52/12 Universal Machine

all the movements and the full range of speeds expected from any type of machine tool. The accessories are supplied in complete units and, as soon as one of these units is fitted to the basic unit, the entire setup becomes a single-purpose machine tool. In the basic unit, the drive from the motor is said to provide a range of 24 spindle speeds from 65 to 2,800 r.p.m. Two locating pads are machined at the front of the head fo rthe accurate location of the various attachments.

are your CUTTING COSTS really down far enough



NO. 3 1/3 FRICTION SAW
HYDRAULIC FEED

you'll never know for certain until you COMPARE your PRESENT cutting speed with

the faster Kling *HIGH SPEED* FRICTION SAW!

What is friction sawing?
It is a proven means of using mechanical heat to cut steel. The weakened steel is removed by each succeeding section of the cooled saw blade—with no apparent wear on the blade.

Fastest, all-around cut-off machine in the shop.
No set-up changes required to cut any sequence of structural shapes. No distortion. One Kling Friction Saw will take the place of several separate shears or slow speed saws. Cuts alloy steels, too, in record time. Because blade life is measured in thousands of cuts, you eliminate downtime and save on tool costs.

Free friction sawing information. *Write today for free booklet on Friction Sawing. Learn how you can profitably apply Friction Sawing in your plant.*

KLING BROS. ENGINEERING WORKS
1328 N. Kostner Ave., Chicago 51, Illinois

How long would it take you to cut these pieces?	Cut it with a Kling in † . .
24" 100 lb. I Beam	28 seconds
15" 55 lb. Channel	15 seconds
8" x 8" x 34.3 lb. H Beam	10 seconds
100 lb. A.R.A. Rail	9 seconds
6½" x 6½" x 19.8 lb. Tee	5 seconds
8" x 8" x ¾" Angle	11 seconds
3" Square	10 seconds
4" Round	15 seconds
6" O.D. Tube, ½" Wall	11 seconds

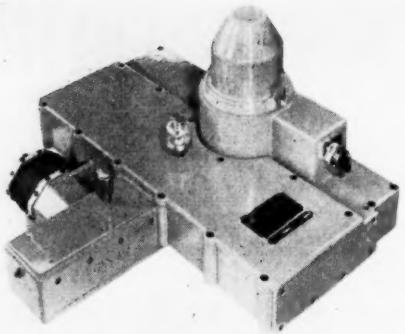
† Approximate Times

Since 1892 **Kling** ***...an investment in speed!***

600BMMR

Automatic Wheel Dresser Produces Almost Any Contour

Designated as the "Magni-Form" Model 42, an automatic contour wheel dresser which is said to be capable of producing almost any desired contour, that can be entered by a diamond, with an accuracy of tenths has been announced by Hoglund Engineering & Mfg. Co., Inc., Berkeley Heights, N. J. The diamond moves across the wheel in an uninterrupted movement, producing a blend between the radii and tangents or any other complex form. An enlarged template controls the movements of the dresser and the diamonds.

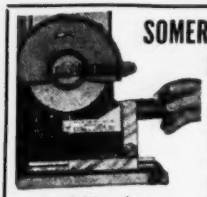


"Magni-Form" Model 42 Automatic Contour Wheel Dresser

The dresser mounts to the right of the footstock on inclined table type plain cylindrical grinders; it has been adapted to Brown & Sharpe No. 5 plain grinders and to Norton 6 x 30 plain grinders and is also available with different bases for other cylindrical grinders.

Redesigned Laboratory Electric Oven Features Recessed, Slanted Base

Blue M Electric Co., 306-308 W. 69th St., Chicago 21, Ill., has announced a



SOMERSET Radius Dresser SAVES TIME

Thousands of Somerset Dressers in service. Offer outstanding features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearever bearing is dustproof.

Write for illustrated folder. *Immediate Delivery.*

SOMERSET TOOL CO. 320 Virginia St. Hillside, N. J.

LUBRICATE CENTERS in 50% LESS TIME

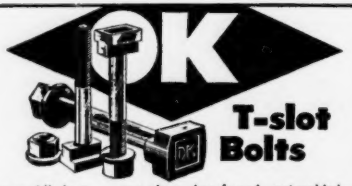
Centers lubricated on lathes and grinders by quick, single "bump" against "H. K. Lube Dispenser." No messy open can of white lead or ever-elusive oil can.

AVOID RUN-OUT! Lubricant sealed-in and flushes outward, keeping center free from borings and chips. Easily mounted on work bench or machine. For greater production . . . greater safety . . . use an "H. K. Lube Dispenser."

H. K. LUBE DISPENSER

H. K. TOOL CO., WAUKESHA, WIS.

WANTED: Distributorships from Coast to Coast



T-slot Bolts

The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½—$1.36; ⅝—$1.36; ¾—$1.58; ⅞—$1.89. Write for price list.

THE O K TOOL COMPANY, INC., Milford 4, N. H.

"BEST BUY . . .
the boss ever made!"

LEACH 6 X 12 SURFACE GRINDER

HIGH OUTPUT
at LOW COST

Don't let the low price fool you! The Leach 6 x 12 Surface Grinder is an entirely new engineering triumph that does the BIG jobs. Easily and accurately handles 90% of the work of far more expensive machines. A proven giant money-saver by hundreds of enthusiastic owners. Completely self-contained . . . 2-speed ball bearing spindle, driven by a ¾ HP motor. Nowhere else can you get such high output at such low cost! Write for detailed description.

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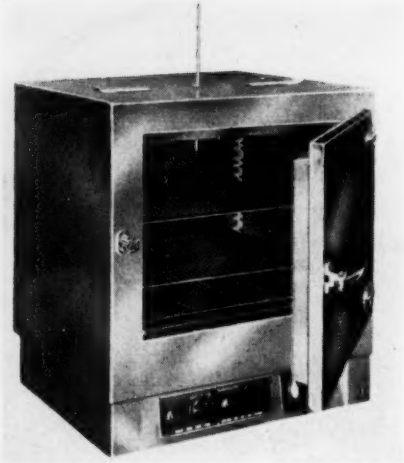
387 CHARLES STREET • PROVIDENCE 4, R. I., U. S. A.
WORLD DISTRIBUTORS DEALERS IN PRINCIPAL CITIES



Blue M Redesigned Laboratory Electric Oven

redesigned series of its electric utility laboratory gravity oven which is designed for analytical laboratory and general laboratory work in the chemical, medical, and metallurgical fields. The redesigned oven features a recessed slanted base to protect all control components from damage due to spillage or accidental bumping. A one-piece etched wiring panel is said to permit easy inspection and/or maintenance.

The oven incorporates a "Modella" Heater Bank which is double banked to provide a complete uniform heating area irrespective of the power selector switch position.

Fiberglas insulation has been increased to 3½ inches on all six sides to ensure thermal wall equilibrium. The oven is of double wall-type construction and is available in either all stainless steel or with stainless steel interior and gray Hammerloid baked enamel exterior. The unit has operating temperatures from 38 to 288 deg. C. and is designed for operation on 115 or 230-volt current.

A BETTER BORING BAR

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar.

Square hole sizes range from ⅛" up to and including ¼".

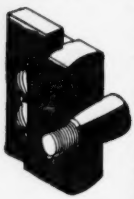
THE DETROIT BORING BAR CO.

688 E. FORT ST. Detroit 26, Mich.

Established 1927

TYPE "B" AND "C" CUTTERS

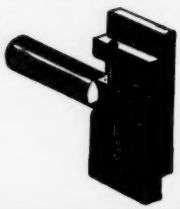
Suitable for Tipping With Tungsten Carbide



"B" *A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes ⅞" dia. up to 6".*

"C" *A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.*

Fits other bars with slots
⅜" x ⅞"
½" x 1"
⅝" x 1⅛"
¾" x 1½".



What You Should Know about the BPS SYSTEM OF TAP SHARPENING*

—and how it can cut tap costs up to 75%!

Leading metalworkers find the B.P.S.* System reduces their tap costs by 50 to 75% — and more! And the same profitable plan is available to *you!*

B.P.S.* SYSTEM ALWAYS WORKS!

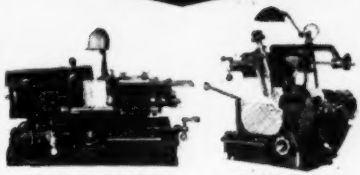
These two simple processes *cannot* fail: (1) Sharpening flutes and chamfers of taps to an exceptionally high degree of accuracy (possible only on Blake grinders) and (2) Sharpening your taps at *regular, planned* intervals.

HOW THE B.P.S.* SYSTEM REDUCES YOUR COSTS

This superior sharpening method gives your taps many times longer life. By using the Blake Chamfer Grinder and Blake Flute Grinder your operators can sharpen each tap precisely to correct any error in indexing and control the rake angle. Precision-sharpened taps cut much more accurately, more uniformly, with less strain — hence serve you more efficiently, far longer!

**Blake Precision Sharpening*

HERE'S WHAT THE B.P.S.* SYSTEM CAN DO FOR YOU!



BLAKE CHAMFER GRINDER — BLAKE FLUTE GRINDER

- Gives much more production per tap!
- Greatly reduces tap costs!
- Provides greater tap accuracy and uniformity!
- Greatly reduces tap breakage and spoiled or unacceptable work!

INVESTIGATE THE B.P.S.* SYSTEM NOW!

Write us for reprints of *American Machinist* and *Machinery* articles on this subject. Descriptive folders on both Blake grinders also available.

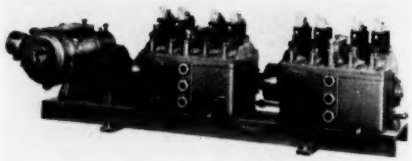
EDWARD BLAKE COMPANY

438 CHERRY STREET • WEST NEWTON 65, MASS.

Black Diamond Precision Drill Grinders • Waltham Cutter Sharpeners • Surface Finish Standards

Forced Feed Lubricator is Said to be Suitable for High Pressure Applications

A high pressure forced feed lubricator designed for cylinder and bearing lubrication of compressors, as well as for many other high pressure applications has been announced by Manzel Division, Frontier Industries, Inc., 315 Babcock St., Buffalo 10, N. Y. Two models are offered. The Model HP20 has a pump assembly with ⅛-inch diameter plunger and will pump 6½ drops of S.A.E. 40 oil per stroke against 20,000 p.s.i.g. The Model HP30 with ¼-inch diameter plunger is said to pump four drops of S.A.E. 40 oil per stroke against 30,000 pounds per square inch per gallon.



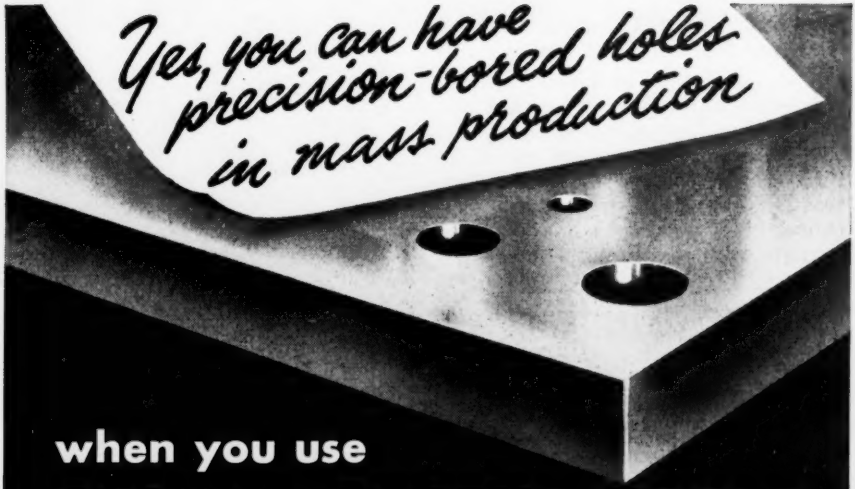
Manzel High Pressure Forced Feed Lubricator

The lubricator consists of four integral sight feed and pump assemblies which are firmly mounted on a rugged cast iron reservoir. The unit is directly connected to a rigid base.

Pumping units are easily accessible and removable without disassembling the lubricator. Pumping rate is controlled by positive, finger-tip adjustment. Steam or electric heaters can be quickly and easily incorporated in the lubricator.

A well-designed hydraulic circuit can help bring soaring costs down to earth . . . in your product, in your plant. The best-designed hydraulic circuits are built around Gerotor pumps . . . for high efficiency, longer life, less slippage, more uniform flow. Specify Gerotor!

GEROTOR MAY CORP., BALTIMORE 3, MD.



when you use

BOKUM BORING TOOLS

The design of Bokum Boring Tools is based on a mathematical formula which guarantees the correct cutting and clearance angles anywhere around the periphery of the cutting head.

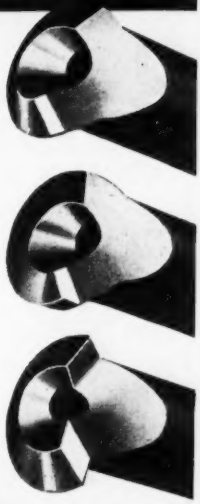
If you're scrapping too much work because of imperfect holes; or if you're discarding half the potential life of your tools, try Bokum Boring Tools. You'll suffer less waste and enjoy more profit.

For maximum life of Bokum Tools, we recommend Bokum special Resharpening Fixtures.

STYLE A *for general boring*

STYLE B *for bottoming and facing*

STYLE C *for internal threading*



Send for the catalog that interests you:

High speed tools No. 1139-6.
Carbide-tipped tools No. 398-6.
Solid carbide for deep hole boring No. 948.

8117A

TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

DEPT. B • 14775 WILDEMERE AVE. • DETROIT 21, MICH.

End Mill Adapter Is Standardized for No. 50 N. S. Drive Milling Machines

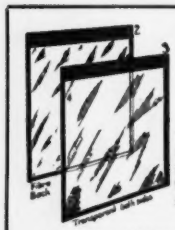
A heavy-duty end mill adapter and auxiliary equipment has been developed by Goddard & Goddard Co., 12280 Burt Rd., Detroit 23, Mich. Standardized for No. 50 N. S. drive milling machines, the adapter holds 2-inch straight-shank end mills, in addition to the specially developed and standardized shell end mill arbors and end mill holders for smaller diameter end mills. The adapter mounts directly on the front spindle flange. Four bolt holes and key slots are said to provide for rigid mounting and positive drive. Two set screws firmly hold straight-shank heavy-duty end mills and auxiliary equipment.

Go & Go Heavy-Duty End Mill Adapter and Auxiliary Equipment

All locating surfaces are finish ground parallel and concentric for true mounting and accurate setting.

Fluteless Drill Is Designed for Drilling Shallow Holes

A fluteless carbide-tipped drill which is specifically designed for drilling shallow holes in cast iron has been developed by Hayden Twist Drill Co.,



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protect
Shop Orders, Drawings, Blueprints, Etc.
Two styles. No. 2 with fibre back, No. 3 transparent both sides. Non-inflammable acetate windows. Special style or size to order.
Write for details.
WADE INSTRUMENT COMPANY
Dept. M, R.F.D. No. 1, Chardon, Ohio

REID
TOOL ROOM ACCESSORIES
CONTROL BALL HANDLES

Round Plastic
Oval Plastic
Round Steel
Mushroom Plastic

The REID Line also includes c.i. hand knobs, hand wheels, machine handles, compression springs and scores of other needed tool room items.

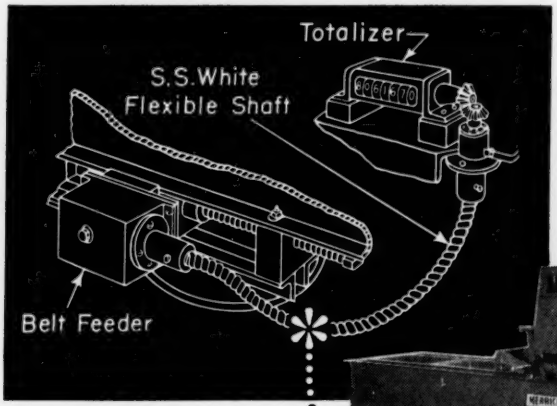
FREE NEW 44 Pg. CAT.

REID TOOL SUPPLY CO.
Muskegon Heights, Michigan

Quick Shipment on
TAPER ATTACHMENTS

For All Lathes—Old or New—
9" to 36" Swing
Write for Bulletin
MASTER-TAPER COMPANY
4531 N. Beacon St., Chicago 40
Excl. Mfrs. of Taper Attachments
$29.50 to $149.50

Another TIME-and-MONEY-SAVING application of



(Above) Drawing showing how S.S.White shafts are used on Feedoweight machines.

S.S.White FLEXIBLE SHAFTS

The Feedoweight, manufactured by the Merrick Scale Mfg. Co., Passaic, N. J. is an automatic weighing machine which accurately feeds and proportions raw materials. An important part of this machine is the totalizer which records weight of all materials handled.

Merrick designers wanted to drive the totalizer from the belt feeder and needed a drive mechanism which would not involve complicated and costly systems of gears and pulleys.

A single, self-contained S.S.White flexible shaft was specified. Results: complicated layout and designing time were eliminated; coupled parts were located for maximum efficiency; fewer parts were used; assembly made easier, and production time and costs reduced.

If you have to transmit power or control to distant parts, take advantage of the simplicity, versatility, and economy of S.S.White flexible shafts.

THIS 256-PAGE HANDBOOK—*FREE*

Gives complete data on flexible shaft selection and application. Free if requested on your business letterhead.

THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.

Dept. 5, 10 East 40th St.
NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE • TIMES BUILDING • LONG BEACH, CALIFORNIA

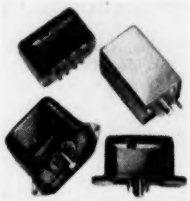
Hayden Fluteless Carbide-Tipped Drill

8626 Lyndon Ave., Detroit 21, Mich. The drill consists of a shank of drill rod between 50 and 60 per cent of the diameter of the carbide tip. The shank and tip are joined together by brazing, the braze material build-up providing strength and rigid support for the tip.

The drill is available in sizes ranging from 13/64 to 11/16 inch and is not recommended for steel.

Relay Is Hermetically Sealed with Octal Plug or Solder Terminals

Barber-Colman Co., 657 Rock St., Rockford, Ill., has announced an ultra-sensitive d.c. relay which is hermetically sealed with either octal plug or solder terminals. The enclosure of the relay is 1⅝ x 1⅝ x 2 $\frac{8}{16}$ inches, and standard contact configuration is S.P.D.T., null seeking.



Barber-Colman Ultra-Sensitive D.C. Relays

Form "C" and latch-in types are also available for many applications. Sensitivities of the null seeking types range from 50 microwatts to 100 milliwatts.

According to the manufacturer, the unit is ideal for balance detecting bridge circuits and as a plate current relay in electronic circuits. A current generating type photocell, it

Severance CUTTING TOOLS HIGH SPEED CARBIDE

MIDGET MILLS - ¼" Shanks
GROUND-from-the-Solid

TEN LEADERS
MORE THAN 20 SHAPES—EACH IN SEVERAL SIZES

Obtain the best from the originator of GROUND-from-the-Solid

Severance JUNIOR MILLS-⅛"Shanks
GROUND-from-the-Solid

Practical for use on small grinders, for finishing Patterns, Dies, Parts, etc., in places difficult to reach with the larger Mills.

HIGH SPEED and CARBIDE

Truly REVOLUTIONARY Cutting Tools

Severance LAB MILLS—3/32" Shanks

These speedy Mills for Dental Laboratories find many uses in Jewelry and in Die and Mold making. Available in 10 popular shapes in 4 or more sizes each, for the finest cutting and finishing. May be reground up to 8 times per 1/32" reduction in diameter

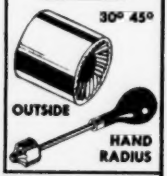
HIGH SPEED
Out-Perform Dental Burs and Grinding Points

Write for Catalog

Complete REGRINDING Service — by New Tool Craftsmen
— Savings are thus multiplied —

SEVERANCE TOOL IND., INC.
724 IOWA AVE., SAGINAW, MICHIGAN

DEBURRING GROUP



TUBING GROUP

COUNTERSINK GROUP

JIG GRINDING ACCURACY *guaranteed**

INFINITE CONTROLLED SPEEDS 30,000 TO 65,000 R. P. M.

Easily connect jig grinder to jig borer or mill

Then you can finish grind in hardened steel to "tenths"... jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

*Dependably accurate to "tenths"

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 8 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3¼" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.

VULCAN TOOL CO., Pritz and Highland, Dayton 10, Ohio

Vulcanaire

It's built by toolmakers for toolmakers

is claimed, will provide sufficient power to operate the relay directly, eliminating amplifiers.

Electric Drill Kit Has 19 Accessories

Designated as the "Copper Line," an electric drill kit, complete with a ¼-inch drill and 19 accessories for drilling, buffing, polishing, grinding, and wire brushing, has been announced by Thor Power Tool Co., Aurora, Ill. The drill is small, lightweight, and streamlined for fast, easy operation, yet is powerfully and sturdily built for long life. The drill features pistol-grip operation and has a trigger lock pin for continuous operation.

Thor "Copper Line" ¼-Inch Electric Drill Kit

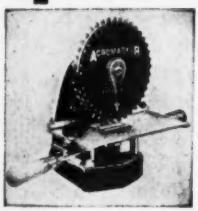
Included with the drill in the kit are a set of 13 drill bits from $\frac{1}{16}$ to ¼ inch for drilling in steel or wood; a precision arbor; a 3-inch grinding wheel; a 4-inch wire brush; a 3-inch buffing wheel; a supply of polishing compound; and a horizontal drill stand for bench or table operations. All items are supplied in a convenient steel carrying case.

TESTING?

you need the . . .

ACROMARKER

(Reg. U.S. Pat. Off.)



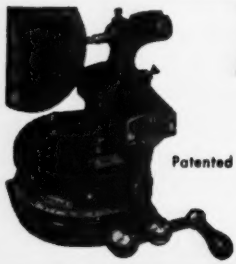
to stamp the tags that record your findings.

"Thousands are in use for stamping name-plates, tools, machine parts, dials, instrument parts, signal system tags, tool checks, etc."

ORDER YOURS NOW

The ACROMARK Company

9 Morrell St., Elizabeth 4, N. J.



Patented

Flash! APPRENTICE BOY DOES MOST DIFFICULT FORM DRESSING

WITH AUTOMATIC ANGLE TANGENT TO RADIUS DRESSER.

By simply turning a handle, the most difficult profiles, either concave or convex, composed of angles absolutely tangent to a radius, can be dressed *AUTOMATICALLY*. Also, any combination of angles or arcs.

Write for Price and Folder. *Dealers' Inquiries Invited.*

JEON MANUFACTURING COMPANY

Post Office Box 6750 Washington 20, D. C.

HELP WANTED

Manufacturing plant needs precision surface grinder capable of high speed for increased production. Qualifications must include: accuracy, flexibility of operation, easy and low-cost maintenance plus durability and long life. References of past experience must be furnished.

here's your answer

Covel Surface Grinders are fully qualified to meet these requirements and are ready to start working for you NOW. Covel has built precision grinders since 1874. Our thousands of satisfied users are your assurance of dependable service and top performance.

QUALIFYING FEATURES

Hydraulic Feed—low-pressure hydraulic system used throughout. Pilot valve gives smooth reversal at high speed. Table speed from 10 to 90 ft. per minute.

Sealed-for-life Spindle requires no lubrication—keeps out grit.

Grinding Wheel Truing Device mounted on vertical slide. Enables wheel to be dressed without removing work from chuck on production grinding. Saves valuable time.

Anti-Friction Ball or Roller Bearings used throughout.

Hard chrome table ways for extra long life.

Hardened and ground cross feed and elevating screws.

TWO SIZES:	No. 20	No. 35
Work capacity	6" x 18"	8" x 24"
Transverse table travel	6¾"	9"
Longitudinal table travel	20"	27"
Grinding wheel size	10"	12"
Capacity under wheel	12"	11"

Write for **BULLETIN MM-93**

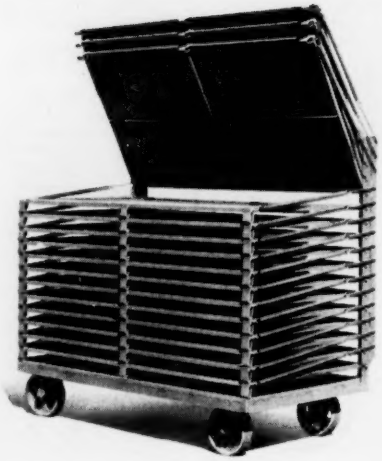
COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTERS & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

Rack Is Designed for Drying or Curing Sheets

Palmer-Shile Co., 16003 Fullerton, Detroit 27, Mich., has announced a book-type rack which is designed for drying or curing sheets or other material where parts must be separate. The shelves of the rack can be raised or lowered easily and are automatically held in position by sturdy extension springs. The shelves are made to user specifications with specified distance between each shelf and are constructed to carry any weight required. The number of shelves on each truck can also be specified. Made for handling with a lift truck or wheeling by hand, the unit can be equipped with either metal or rubber-tired wheels.



Palmer-Shile Book-Type Rack

CAMS

We are fully equipped to **GRIND** OR **MILL** a complete range of CAMS to your specifications on our **ROWBOTTOM** Cam Milling Machines.

Your inquiries answered promptly.

HIMOFF MACHINE CO., INC.
23-16 44th Road Long Island City 1, N. Y.

Tool Adapter for B&S Automatic Screw Machines

American Cam Co., Inc., Hartford 1, Conn., has announced a precision-ground tool adapter which is designed for use on Brown & Sharpe automatic screw machines. According to the man-

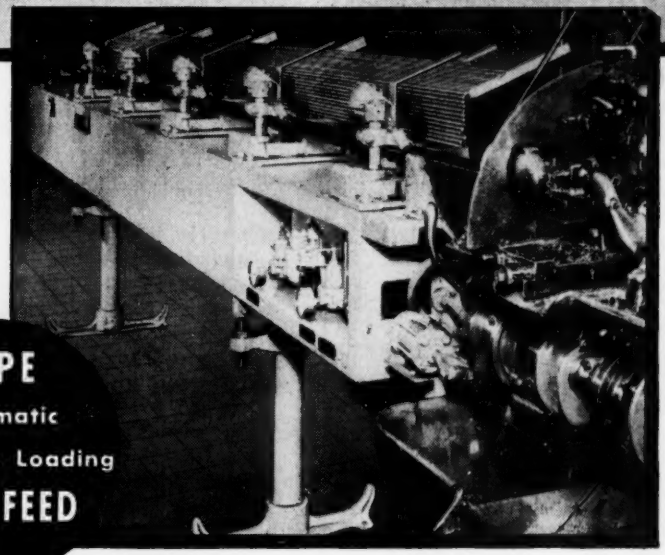
HARDENED and GROUND HSS BLANKS

Any decimal diameter to 5/8" —in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

Write for price list D-2

WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

BOOST SCREW MACHINE OUTPUT 60% to 100%...*EVEN MORE!*



SUPPOSE you could run your screw machine continuously — get a *full* 8-hour-day production — with no time lost for loading, replacing feed fingers, cutting air or idle operation. How much would your production go up? 10%? 20%?

Revise your estimate — you're way low. By converting lost time into productive time in hundreds of plants, *Lipe Automatic Loading Bar Feeds* have increased output 60% to 100%. One user reports a production increase of 221%!

OUR UNCONDITIONAL GUARANTEE. Lipe AML Bar Feed will enable your screw machine to produce at least 90% of its gross geared capacity.

WHAT A LIPE AML BAR FEED WILL DO FOR YOU:

Feed tubes or bars automatically, continuously.

Abolish feed fingers—eliminate time lost in making feed finger adjustments.

Feed stock up to 16" long in one feed-out operation—save the time lost with multiple feed finger feed-outs, thus cutting cycle time.

Reduced cycle time increases gross geared production capacity of screw machine.

- Interested? Send for folder describing AML Bar Feed—operation, benefits, case histories.

LIPE ROLLWAY

Lipe - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.

Only

THRIFTMASTER
Universal Joint Type
DRILL HEADS

have these exclusive* features

*Standard Full Ball Bearing Construction, including Spindles

Driving assembly is *Full Ball Bearing* mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.

*Standard Slip-On and Slip-Off Template Construction

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

6 Standard Models . . .

Models U-608 and U-1000—Ball Bearing

Models U-620B and U-1012B—Plain Bearing, 11/16" or 1/2" min. centers

Models U-608-BS and U-1000-BS—Ball Bearing Gear Case, Plain Spindles

Semi-Standard Heavy Duty Full Ball Bearing . . .

1/2" in Cast Iron—1-7/16" min. centers
7-1/8" or 9-3/4" Dia.

1/2" in Steel—1-13/16" min. centers
7" or 9-5/8" Dia.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

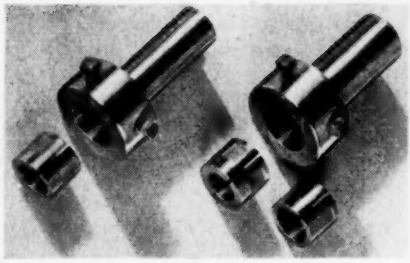
WRITE FOR FULL INFORMATION

Subsidiary of
Thomson Industries, Inc.

THRIFTMASTER *Products Corporation*

1034 N. PLUM STREET
LANCASTER, PA.

Also Makers of
DORMAN AUTOMATIC REVERSE TAPPERS



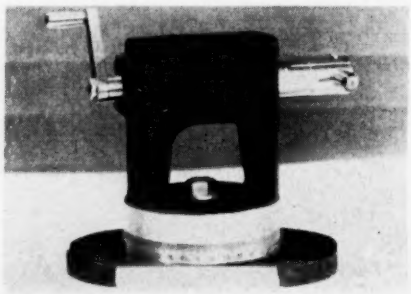
American Tool Adapters and Bushings

ufacturer, it is now possible to use No. 00 tools on No. 0 machines and either No. 00 or No. 0 tools on No. 2 machines by using only two adapters. The reduction to two sizes is said to be accomplished by means of interchangeable self-locating bushings which are hardened and precision ground. Both the adapters and bushings are made of fine alloy steel, and all surfaces are hardened and ground for accuracy and long life.

Instrument Is Designed for Dressing Emery Wheels

Designated as the "Phelco," an angle dresser which is designed as a precision instrument for dressing emery wheels, has been announced by Phelan Engineering Service, 1913 W. Magnolia, Burbank, Calif. According to

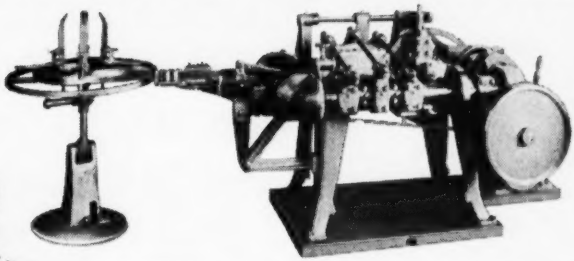
"Phelco" Angle Dresser



NILSON FOUR-SLIDE

It's easy to get
HIGH PRODUCTION
. . . and UNIFORMITY, too!

Wire and Ribbon Metal FORMING MACHINES



UNIFORMITY in automatic production doesn't come by chance! In the case of wire and ribbon stock forming on NILSON 4-SLIDES, *it means control of the material from the coil to the final form.*

Parts, such as illustrated, are produced to tolerances of .002 at critical dimensions. Dies and forming tools, once installed (faster and simpler with NILSON'S open construction) maintain close tolerances for short and long runs. One machine! One set-up! Increased production! Maximum uniformity!

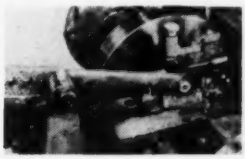
Model SF3 NILSON 4-SLIDE, shown above, with No. 51B Tilting Stock Reel, is a complete unit that can be set-up in any convenient location.

Range of sizes

Wire Forming — 1/32" through ¼" wire. Feeds up to 32".

Ribbon Stock Forming — $\frac{1}{32}$" through 3½" wide material. Capacity of press section 5 to 30 tons; 50 to 75 tons in heavy duty types.

Close-up of the NILSON forming section with the built-in Horizontal Press to the left. This design eliminates secondary handling and insures product uniformity because the sequence of stamping and forming is automatically controlled.



Close-up of the NILSON feed mechanism . . . capable of feeding wire and ribbon metal to tolerances of .001. Another important element in insuring product uniformity. Positive control is maintained over the material regardless the length of feed.

For specific recommendations — send details of your operation.

NILSON has been specializing in Forming Equipment for over 50 years.

NILSON

THE A. H. NILSON MACHINE COMPANY

1514 Railroad Avenue • Bridgeport 5, Connecticut

CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • HAMILTON, ONT., CANADA

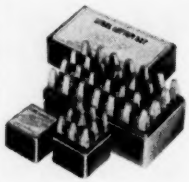
Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

the manufacturer, the dresser can dress both sides of the wheel without disturbing the original setup by means of a double-end diamond. The unit can be used on both cylindrical and surface grinders.

The dresser has a diamond travel of 2¼ inches, and accuracy is said to be assured by means of a threaded shaft, operated by a small hand crank. The base of the unit is graduated into 360 degrees in 1-degree increments.

Stamps Are Available in Durable Plastic Containers

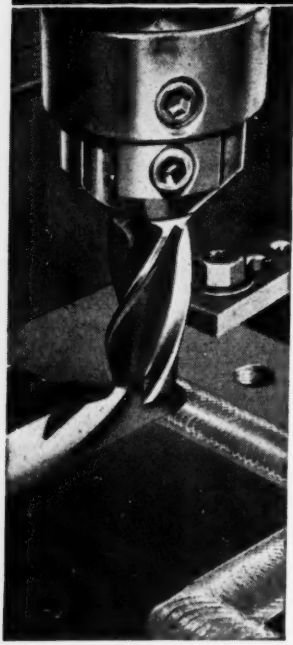
Steel number and letter sets in popular sizes, produced by The Parker Stamp Works, Inc., 650 Franklin Ave., Hartford, Conn., are now being packaged in durable plastic containers for simplified selection and easy storage. Each box is fabricated for high-quality break-resistant plastic and features square holes to keep stamps in the correct position, ready for instant use. Die number and letter sets for stamping plastic molds, die casting dies, and other cavities are also available in the same improved package.



Parker Steel Number and Letter Sets in plastic containers

Available in 17 sizes from 1/32 to 1 inch, the number and letter sets are made with plain Gothic-style characters. The stamps are machined from fine tool steel and properly heat treated and gaged for exact size. Heavy uniform bevels are said to assure maximum strength and long marking life.

YESTERDAY'S PIONEER . . . TODAY'S LEADER



HEAVY DUTY END MILLS and HOLDERS

(Both are Stock Items)

● Look at this rugged 2" diameter Weldon end mill with 4" long flutes which made a 2½" deep cut in a solid block of die steel—4140 steel heat treated to 260 Brinnell. The feed was 1½" per minute, and the material was removed at a rate of 7½ cubic inches per minute.

This HEAVY DUTY Weldon end mill is held by a new-style end mill holder which bolts securely on to the nose of the milling machine spindle. The holder, located by a centering plug, is driven by two drive keys on the spindle nose. The 2" diameter shanks of these heavy-duty end mills are securely held by two large hollow head screws.

For top performance and sturdy long life in end mills—large or small—look to Weldon.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

SEND FOR LATEST CATALOG NO. 10

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

MODEL J
10" x 18" Capacity

Check its

✓ CAPACITY
✓ STRENGTH
✓ 3-Point Suspension
✓ Safety
✓ Centralized CONTROL

and You'll buy a

JOHNSON BAND SAW

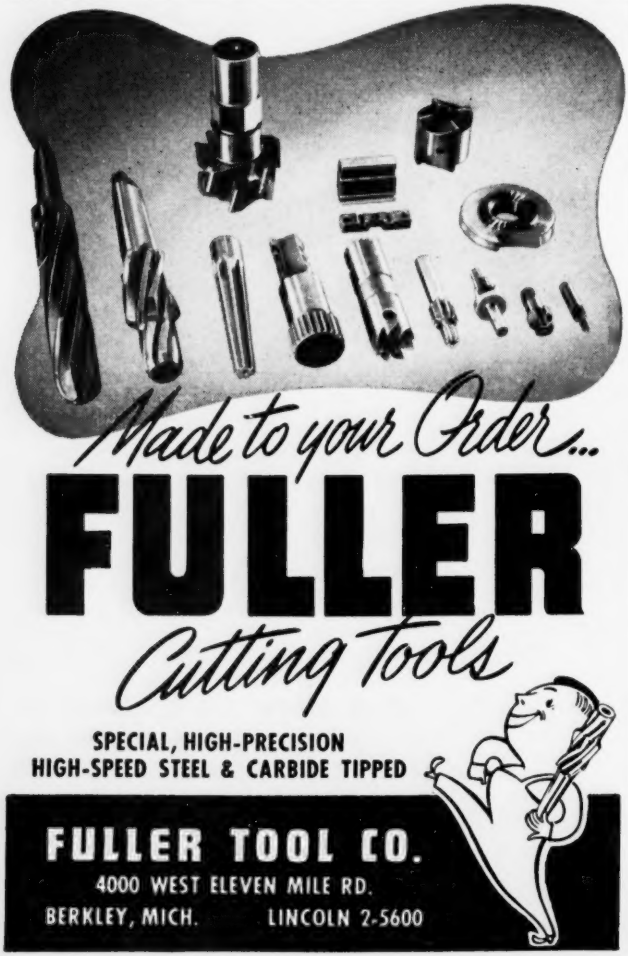
WRITE FOR DETAILS

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN

Strippable Coating Prevents Corrosion and Damage to Parts

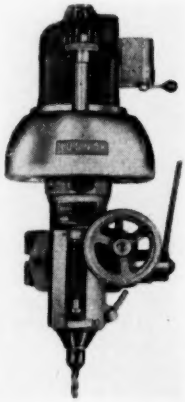
Designated as Thermo-Cote D, a protective strippable coating which, it is claimed, prevents corrosion or abrasion damage to metal tools and parts during storage, handling, or shipment has been developed by Plastics Division, Ernst Bischoff Co., Inc., Ivoryton, Conn. The compound is an ethylcelulose base coating which is applied by the hot dip process. Supplied in convenient small blocks, the material is melted in a thermostatically-controlled tank and brought to proper dipping temperature.

The melt is clear and transparent, and the coating is said to remain homogeneous under heat. The recommended maximum dip temperature is 350 deg. F. Prolonged heating to temperatures in excess of 360 deg. F. is said to tend to cause darkening and brittleness.



Mill Head Has 1-H.P. Motor

Rusnok Tool Works, 4840 W. North Ave., Chicago 39, Ill., has announced that its "ST" Mill



Rusnok 1-H.P. "ST" Mill Head

Head is now being manufactured with a full 1-h.p. motor with a ¾-inch end mill capacity in steel. The 1-h.p. motor is in addition to

SELECT PRESSURE NEEDED...FROM 5 TO 500 LBS. GET UNIFORM, CONSTANT HYDRAULIC CONTROL

TRADE MARK "FULFLO" REG U S PAT OFF

OIL BY-PASS RELIEF VALVES

BRASS OR CAST IRON

Pipe sizes: ¼" to 2"

Simplest and quietest valves on the market!

Select pressure from 5 springs . . . install . . . no maintenance needed.

For ram presses, machine tool hydraulic mechanism, Diesel and oil burning equipment.

NON-CHATTERING because the cylindrical piston does not seat abruptly against valve. This relieves pounding or chattering noise in valves using conventional seat.

Write on your letterhead for personal copy, FULFLO MECHANICAL DATA BOOK. State if for Valves, for Pumps or both.

Standard or Flange

TRADE MARK "FULFLO" REG U S PAT OFF

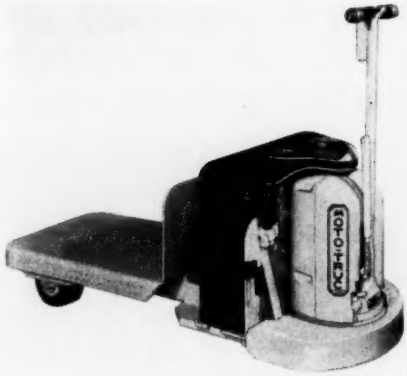
THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

the standard ½-h.p. motor furnished on the ST Heavy Duty and the ¼-h.p. motor which is standard on the No. 70 Convertical model.

Improved Truck Features Redesigned Power Unit

The Moto-Truc Co., 1979 E. 59th St., Cleveland 3, Ohio, has announced an improved truck which features a redesigned power unit to afford easier maintenance. The unit cover can be taken off by removing four bolts, exposing the complete power unit. The cover, it is claimed, protects the drive unit from foreign matter, dust, and dirt. The removal of four power unit mounting bolts is said to make the complete unit interchangeable.

The power unit includes a time-delay slow-speed switch which is said to eliminate the possibility of the operator starting the truck in high speed. Electric battery cables and connector have been lowered and repositioned to better protect them from damage. Actual mechanical operation has not been changed, and the drive unit, hydraulic unit, and roller grip controls remain the same.



Improved Moto-Truc

for BETTER PRODUCTION and MAINTENANCE *at lower cost*

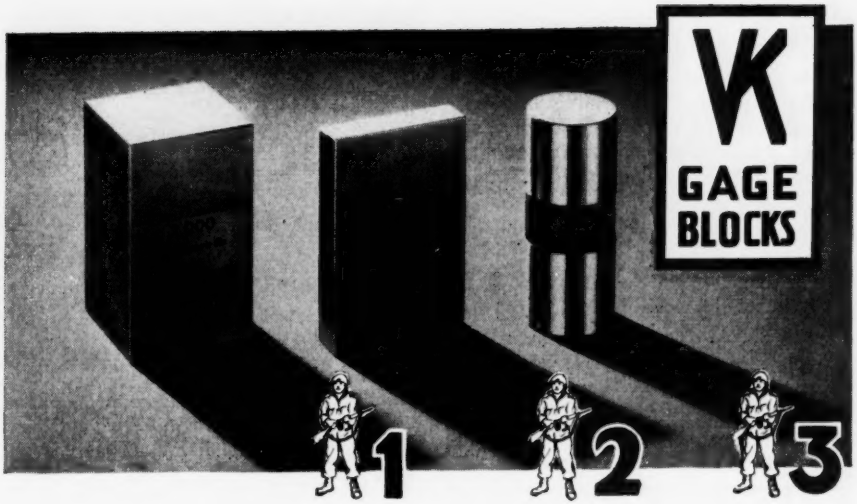
A proved time-saver in any sized shop. Libert's *flexibility* gives you a wider variety of work—clean shearing of flat or formed sheet metal... straight or irregular shapes... inside or outside cuts. Libert *simplicity* means that even unskilled labor soon does accurate work, lots of it *and fast!*

Write for bulletin.

LIBERT MACHINE CO.
GREEN BAY • WISCONSIN

Made in sizes up to 60 in. throat, 10 gauge capacity

Libert Hi-Speed SHEAR



SOLDIERS THREE . . . *defending production accuracy*

To meet the requirements of the current defense effort in meeting closest limits of accuracy and protecting production, Van Keuren is currently furnishing three types of gage blocks:

1—SOLID SQUARE MASTER BLOCKS **2—RECTANGULAR REFERENCE GAGES**
3—MICROGAGES

Shipment on complete sets of any of these three types can be made within 60 days from receipt of order.

VK Solid Square Master Blocks are accurate to .000004" per inch of length and are designed for laboratory use or to standardize all shop dimensions. Large wearing surface; perfect parallelism. Available in 85- and 41-block sets and guaranteed unconditionally for 5 years not to exceed .0001" in wear.

VK Rectangular Reference Gages are guaranteed accurate to .000008" per inch of length and are designed for the inspection department or precision set up work. They are available in 81-block and 33-block sets. Individual blocks from either of these sets can also be furnished. Certificate of size is also furnished with each set.

VK Microgages are accurate to plus .000012", minus .000008" per inch of length and are designed as working gages for shop use . . . to put accuracy at the machine. Wearing surface is 40% greater than that of rectangular gage blocks, hence their long-wearing quality. Available in several set combinations.

Van Keuren Gage Blocks are fully described in Catalog and Handbook No. 35, yours for the asking by writing: The Van Keuren Co., 175 Waltham St., Watertown, Mass.

VK
34th YEAR

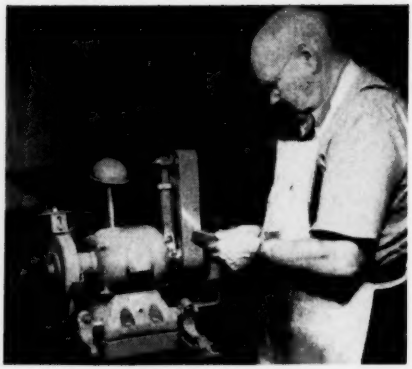
THE *Van Keuren* CO.,

175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

Attachment Is Designed for Grinding and Polishing Operations

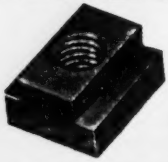
Designated as the "Adapt-A-Belt," an attachment for grinding and polishing operations that is designed for use as a portable grinder attached to an air outlet or for clamping on lathes, milling machines, drill presses, or pedestal grinders has been announced by



Curtis "Adapt-A-Belt" Grinding Attachment in use on a pedestal grinder

Curtis Machine Corp., Jamestown, N. Y. The unit utilizes dynamically-balanced rubber-covered contact wheels in various diameters, widths, and durometer, as well as soft or hard cloth wheels. The attachment is of rigid lightweight steel construction and incorporates universal attaching clamps and an abrasive belt tracking mechanism with belt tensioning. Grinding, it is claimed, can be accomplished with either end or slack belt.

The unit is available in two models; namely, the Model A-1 which uses abrasive belts up to 1 inch in width and which weighs 2¼ lb., and the Model A-2 which will accommodate belts up to 2 inches in width and which weighs 2½ pounds.



T-NUTS
STUD SETS
STRAP CLAMPS
SURE GRIP STEP BLOCKS
TIETZMANN TOOL CORP.
ENGLEWOOD, OHIO

Columbia
TOOL STEELS for all tools for all purposes
★
HOT WORK-SHOCK RESISTING:
Formite Firedie Formite No. 2 Buster C.E.C.
COLUMBIA TOOL STEEL COMPANY
TOOL COLUMBIA STEELS
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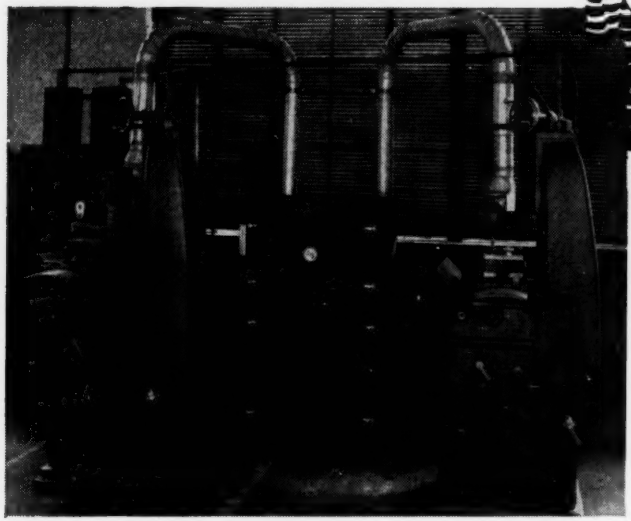
HIGH SPEED DRILLS
FLAT TWISTED AND ROLLED SECTION

Special Lengths and Types
PROMPT DELIVERY
Manufacturers Since 1903
HI-DUTY DRILL WORKS
FLEETWOOD, PA.

It Pays to Modernize—



Get Low Cost Dust Protection With

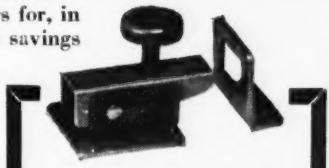
TORIT DUST COLLECTORS

Everywhere, cost conscious plant managers are modernizing production set ups with Torit Dust Collectors for, in addition to their known efficiency, they produce savings all along the line. Among these are:

- Low investment and installation expense.
- Minimum piping for less friction loss.
- Can be wired to eliminate idle operation.
- Cleaned air recirculated—no heat losses.
- Self-contained they occupy little space.
- Easy to re-install in new locations.
- Wide selection of stock models.

see our catalog in MACHINE TOOL CATALOGS or write for copy

Join this modernization parade by increasing your plant's efficiency with Torit Dust Collectors. For complete information write:



TORIT DOOR FASTENERS

The sturdy and efficient door fastener used on Torit cabinets is available for use on your own products. Strike plate either flat or angular. Write for quantity prices.

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296 Walnut Street
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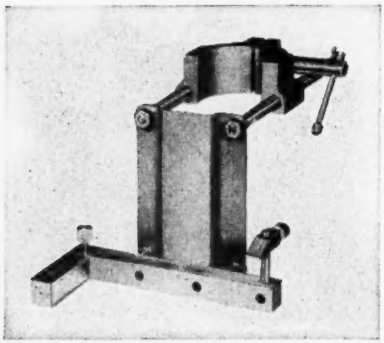
Drill Press Safety Guide Eliminates Need for Fastening Devices

The Walker-Turner Division, Kearney & Trecker Corp., Plainfield, N. J.,



Walker Turner Safety Guide

has announced a drill press work guide and holder which is said to eliminate the need for fastening devices. Attaching directly to the column of the drill press, the unit is fully adjustable on the table and is firmly locked in position with a locking screw. According to the manufacturer, the work guide and holder can be used in conjunction with jigs or can be used to hold a standard drill press vise, as well as to hold and position work without other fixtures.

The unit will fit any drill press having either 2¾ or 3¾-inch columns. Models are available for either bench, floor, or multiple-spindle type drill presses.

End Finishing Machine Handles up to 3-Inch O.D. Work

Designated as the Series 700, an air-operated end-finishing machine which is designed for large work up to 3-inch o.d. and is said to speed performance of deburring, chamfering, and facing operations has been announced by Pines Engineering Co., Inc., 644 Wal-

Nicholson Air-Gas-Steam Traps

NEVER NEED PRIME

Nicholson weight-operated traps, under no condition, leak medium from a power transmission system. This prevents the costly loss of air, gas or steam occurring when inverted bucket traps lose their prime. Under such conditions Nicholson traps hold tight because they do not depend on buoyancy of float to raise valve. 3 types; pressures to 1500 lbs.

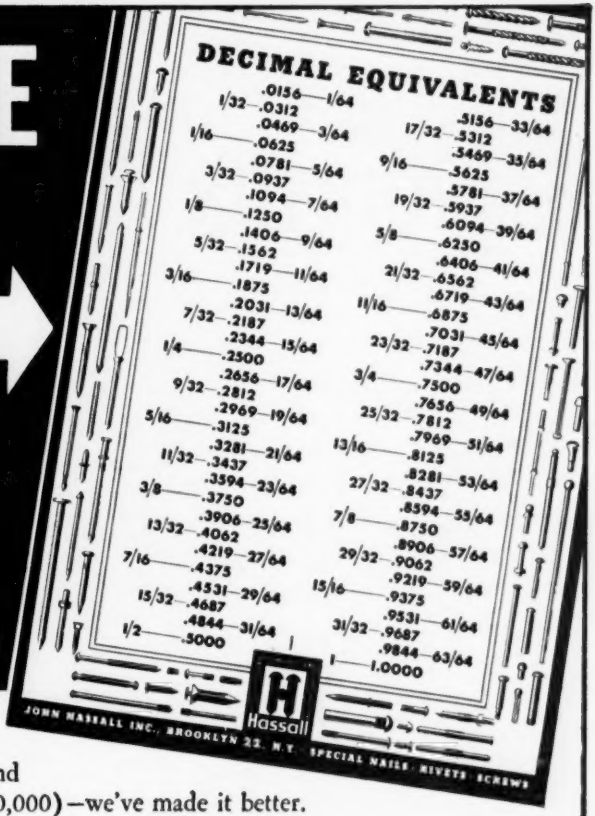
136 Oregon St., Wilkes-Barre, Pa.

CAT'G 751

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

WRITE FOR FREE Hassall decimal-equivalent wall chart



In such popular demand (we've given away 50,000)—we've made it better. The new chart is far easier to read! In three colors to automatically signal decimal-equivalents of fractions. The special products which frame the chart are a constant reminder of a good source of cold-headed parts.

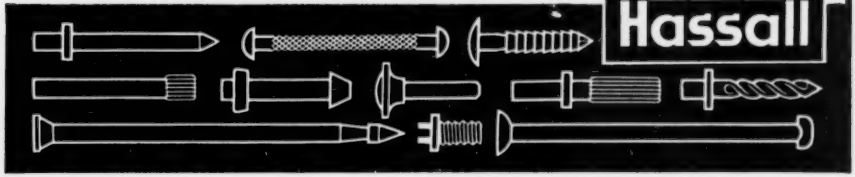
JOHN HASSALL, INC.

P. O. BOX 2177 • WESTBURY, N. Y.

ESTABLISHED 1850

SPECIAL NAILS RIVETS SCREWS

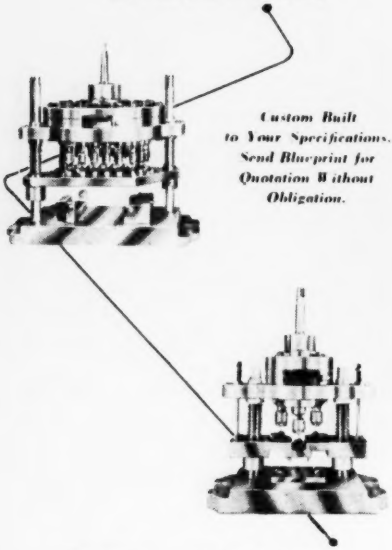
Hassall



FOR MULTIPLE DRILLING OF HOLES ON PRODUCTION RUNS . . .

ERRINGTON

FIXED CENTER DRILLING HEADS
with JIGS and FIXTURES



Custom Built to Your Specifications. Send Blueprint for Quotation Without Obligation.

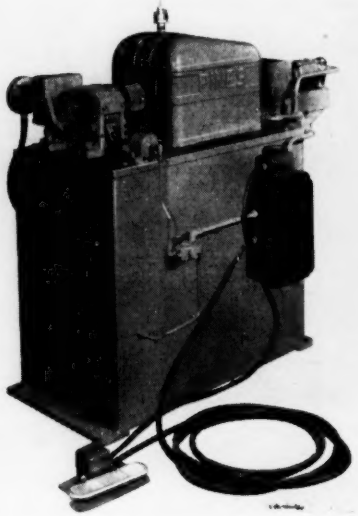
Do more . . . and do it better with Errington Fixed Center Drilling Heads. They drill any number of varied size holes on different elevations. The head has grooved thrust ball bearings at all thrust points and hardened bronze radial bearings. Heat treated spindles and gears, of one piece turned from solid bar stock. It is geared approximately 2:1. All enclosed in a sand-cast aluminum case and cover, with alemite pressure lubrication.

Send for Complete Catalog

ERRINGTON Mechanical Laboratory, Inc.
Established 1891
Main Office and Plant STATEN ISLAND 4, NEW YORK

nut St., Aurora, Ill. The machine has a 2-inch stroke and a maximum spindle speed of 2,000 r.p.m. for fast operation.

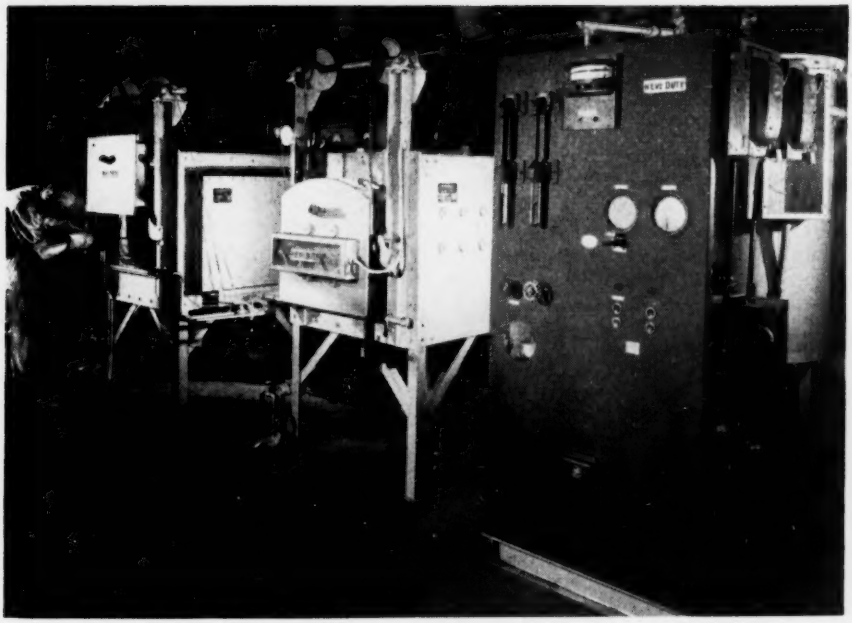
The chuck and spindle air cylinders are controlled through a convenient electric foot switch. The spindle advance unit is a Bellows air cylinder with a hydrocheck which controls the feed rate of the tools. An adjustable



Pines Series 700 Air-Operated End-Finishing Machine

stop automatically retracts the spindle when the cut is completed.

The unit has a wide range of applications for such operations as light turning with hollow mill tools, chamfering and pointing bar stock, shaping tube or rod ends, or center drilling. The machine base measures 20 inches wide x 39 inches long, with a 6-inch chuck overhang on the width and an 18-inch overhang of the spindle unit to the rear. The total overall floor space requirement of the machine is 26 inches wide x 57 inches long x 45⅝ inches high.



Tools and Dies Heat Treated in HEVI DUTY® Controlled ATMOSPHERE FURNACES

Allis-Chalmers of Milwaukee is using Hevi Duty Controlled Atmosphere Furnaces to heat treat tools and dies made from high carbon, high chrome steels, 18-4-1, molybdenum, and cobalt high speed steels.

This combination of a Hevi Duty Endothermic Atmosphere Generator, a Hevi Duty Box Type Hardening Furnace, and a Hevi Duty High Temperature Furnace assures you that tools and dies can be treated to exact hardness. Achieve better heat treating results by specifying Hevi Duty Furnaces. Write for Bulletin 153.

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

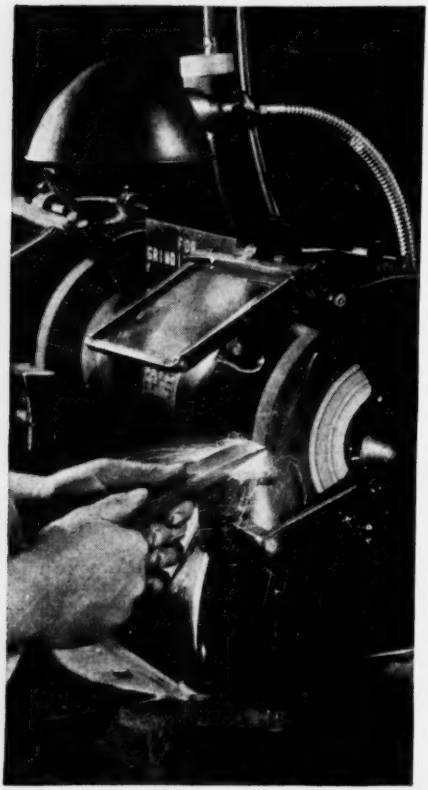
Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

Centerless Grinder Is Designed for Producing Rotors and Rotor Shafts

Eric R. Bachmann Co., 27-11 41st Ave., Long Island City, N. Y., has announced the Herminghausen Centerless Grinder which is designed for production grinding of rotors and rotor shafts for small electrical motors. The rotors, together with their shafts, are introduced into the grinder by means of a feed arm. The grinding wheel and the feed wheel are split, one part of the grinding wheel grinding the cylindrical portion of the shaft and the other part, dressed with a step, grinding the pointed end of the shaft. The axis of the grinding wheel and feed wheel are set parallel.

The grinder is available in three models; namely, Model SR 15 with up to a $\frac{5}{8}$-inch diameter capacity; Model



Cut your TOOL GRINDING costs... with wheels *engineered* for the job!

Choose the *right* grinding wheel for *every* tool grinding job—from the complete line by CARBORUNDUM.® That's the first step toward longer cutting life for your tools... lower maintenance costs in the tool room.

Every tool room grinding wheel by CARBORUNDUM is engineered to do a specific job at the lowest possible cost. You may want faster production of cutting angles, rakes and clearances; or perhaps better finish is more important; or cooler cutting. Whatever features, or combination of features, you may require—there's a tool room grinding wheel by CARBORUNDUM that's *right* for you. Whether you're grinding high speed steel, alloy, or cemented carbide cutting tools, not only these wheels but coated abrasive belts by CARBORUNDUM can help you cut costs.

YOUR CARBORUNDUM DISTRIBUTOR or salesman is ready to help you make the right selection—why not call him today?

Two Helpful Booklets . . . "Maintenance of Alloy and High Speed Cutting Tools" and "Grinding Cemented Carbides"—tell you more ways to cut tool room maintenance costs. They're free—ask for either or both. The Carborundum Co., Dept. M M 81-316A, Niagara Falls, New York.

CARBORUNDUM
REGISTERED TRADE MARK

the ONLY source for EVERY abrasive product you need

81-316A

Look here

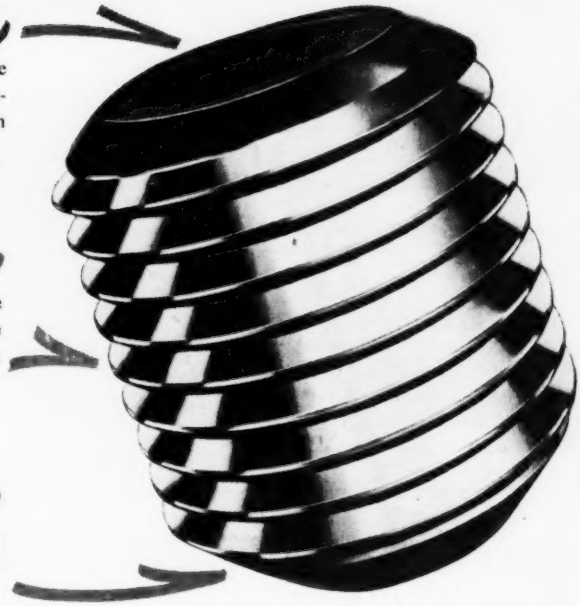
and see why the P-K Hex is the Standard for accuracy. It's true-centered, true to size, right depth for easy keying!*

Look here

for P-K *Ground Threads*, the smoothest, brightest, gage-like threads you've ever seen on a Socket Set Screw!*

Look here

for clean, burr-free starting threads, another advantage of P-K thread-grinding that means faster assembly!*



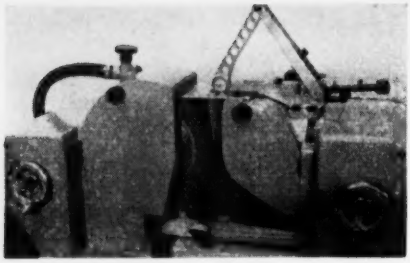
* You'll have to *look beyond* even the best picture to see the super-smooth, gleaming finish, the years-ahead quality of P-K Ground Thread Socket Set Screws. But you'll agree when you see the actual screws.

So get SAMPLES . . . and compare. Ask your P-K Distributor, or write Parker-Kalon Corporation, 200 Varick St., New York 14.

The **INDUSTRIAL DISTRIBUTOR** steers your Supply Dollars to the best values.

PARKER-KALON®

Cold-forged **SOCKET SCREWS**



Close-up view of Herminghausen Centerless Grinder showing feed arm

SR 30 with up to 1¼-inch diameter capacity; and Model SR 100 with up to a 4-inch diameter capacity. Each model is available for infeed or throughfeed. The dressing device for the grinding wheel is standard equipment, whereas the dressing attachment of feed wheels is optional.

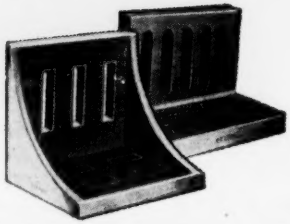
Drawing Lubricants Are Designed for Light Press Work

Designated as Vantrol 5481, a series of three drawing lubricants designed for light press work where speed, ease of application, and ease of removal are prime factors has been developed by Van Straaten Chemical Co., 546 W. Washington St., Chicago 6, Ill. Vantrol 5481C is a pigmented extreme-pressure paste-type product which is said to provide an unusual finish and eliminate scratches and metal pickup. Vantrol 5481B is a non-pigmented extreme-pressure type material in the form of an oil with a viscosity of 400 to 460 seconds at 100 degrees Saybolt. This compound is for light draws where metal pickup is not a problem. Vantrol 5481A is a non-pigmented compound, similar to the 5481B, but with a viscosity of 305 to 320 seconds at 100 degrees Saybolt.

Victor's Specials Deserve Your Attention!

ECLIPSE
ANGLE PLATES

Accurate . . . Rugged



Eclipse Angle Plates are available in "Webbed End" and "Open End" patterns. Made from high quality castings and seasoned before machining to prevent distortion. All faces of Open End and outside faces and edges of Webbed End patterns are machined square and parallel.

WEBBED	COST	LENGTH	1st ANGLE	2nd ANGLE	OPEN END	COST
No. 199	$ 2.50	3"	2½"	2"	....	....
No. 200	3.25	3½"	3"	2½"	....	....
No. 201	4.25	4½"	3½"	3"	No. 301	$ 5.50
No. 202	5.50	6"	5"	4½"	No. 302	7.75
No. 203	7.00	7"	5½"	4½"	No. 303	9.25
No. 204	9.00	8"	6"	5"	No. 304	11.50
No. 205	11.50	9"	7"	6"	No. 305	14.50
No. 206	17.00	10"	8"	6"	No. 306	18.50
No. 207	22.00	12"	9"	8"	No. 307	24.00

VICTOR MACHINERY EXCHANGE, INC.
DEALERS IN TOOL ROOM EQUIPMENT
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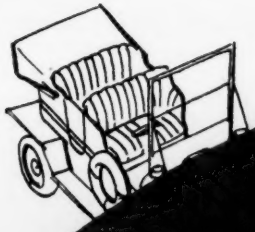
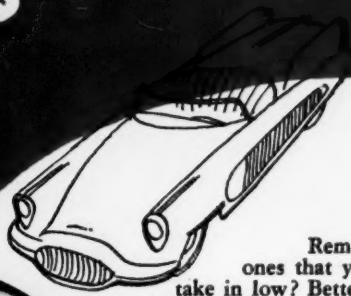


ARE YOU MAKING THE HILLS IN HIGH?



Remember the ones that you had to take in low? Better engines, better roads, better everything, came out of new improved machine tools. That progress continues. Every metal working operation in your plant starts with cutting-off the stock. Here late model RACINE Hydraulic Power Saws will increase production — cut more accurately — save material and get more out of your present high priced man-hours. You may have good equipment now, but improved models will save more than their cost.

Get complete information on RACINE'S full line in capacities from 6" x 6" to 20" x 20". Single purpose and fully automatic bar-feed models. Write today for free engineering production estimates on your own jobs. RACINE HYDRAULICS & MACHINERY, INC., 2070 Albert St., Racine, Wisc.

RACINE · STANDARD FOR QUALITY AND PRECISION · RACINE HYDRAULICS & MACHINERY, INC.

RACINE STANDARD FOR QUALITY AND PRECISION

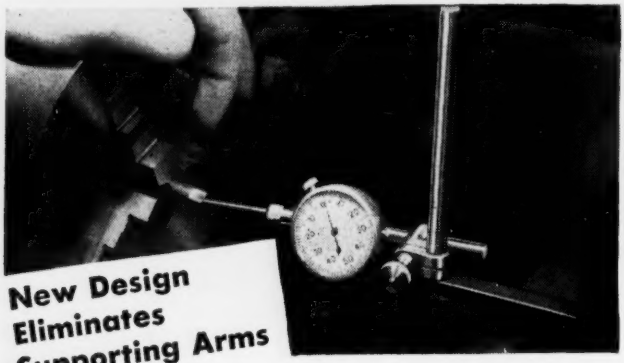
According to the manufacturer, the lubricants were originally designed for drawing or forming stainless and high-alloy steel but also can be used satisfactorily with carbon steels.

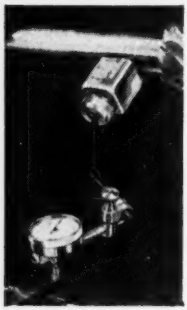
Wheel Is Designed for Grinding All Types of Cemented Carbide Tools

Identified by the symbol MM, a grinding wheel which is said to be capable of grinding all types of cemented carbide tools has been announced by Macklin Co., Jackson, Mich. A fine, loose abrasive is embedded, in pellet form, throughout the wheel. As the tool is applied to the wheel, a flow of loose abrasive is said to be constantly between the metal and the wheel, thus permitting the main body of the wheel to be somewhat harder. The fine grain, it is claimed, provides a good finish and the harder grade resists excessive grooving of the wheel. Also, the wheel, it is claimed, practically eliminates dust. In the grinding of inserted carbide single-point tools, the manufacturer states that the wheel grinds the shank steel equally as well as the carbide itself.

Macklin MM Grinding Wheel

The Macklin MM Grinding Wheel is available in standard steel back and cylinder sizes in a variety of gradings designed to meet specific requirements.





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UNIVERSAL DIAL
TEST INDICATOR
Shortens Working Time

Modern simplified design gives faster readings, guarantees long accurate service. Extra long hole attachment screws directly into base — *requires no supporting arms.* One piece base and shank, jewelled thrust bearing, smooth, sensitive mechanism that requires no oiling, adjustable bezel and the easy-to-read dial make the Lufkin Universal Dial Test Indicator lighter, more accurate, more durable. Packed in fitted wood cases complete with all attachments.

262

Many New LUFKIN Precision Tools make your work easier and better

SEND FOR Free ILLUSTRATED New Tools Booklet

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THE LUFKIN RULE CO., Saginaw, Michigan, Dept. MMS
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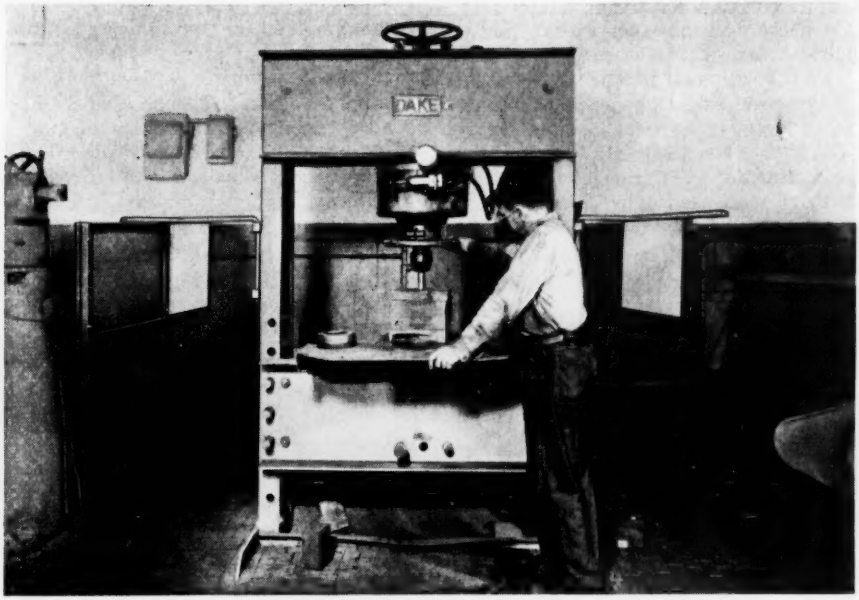


DAKE PRESS REPLACES THE "HERNIA METHOD" OF KNOCKING OUT DIE INSERTS

The job of knocking out forging die inserts formerly required two men, and sometimes several hours of hand sledging. Now one man does it easily in a few minutes with a Dake 125-ton Air-hydraulic Press.

The die and drive pin are placed under the press ram as shown, and pressure is applied up to the 125-ton capacity. If pressure alone fails to break the insert loose, heat is applied around the die until expansion permits breakaway, which comes with a sudden impact under the sustained high pressure.

Savings in labor costs have been tremendous, and labor relations have been greatly improved.

Dake Hydraulic Presses have scores of uses in industry. A variety of styles and capacities makes them adaptable to almost any requirement. We suggest that you contact your nearest Dake representative about your pressing problems—or write us and we will ask him to call.

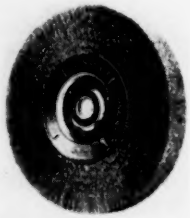
Dake Engine Company, 612 Seventh St., Grand Haven, Mich.

DAKE PRESSES

Wheelbrush Provides Long Life

Designated as the Fullanchor, a wheelbrush which is said to provide long life, unusual performance, maximum wheel speeds, balance, and maximum safety has been announced by The Fuller Brush Co., Industrial Division, Hartford 2, Conn. As the trim of the brush wears down, larger sideplates, it is claimed, can easily be exchanged for smaller ones, thus exposing a new length of trim and increasing the life of the brush. Balance is said to be achieved by clamping an almost identical number of filaments in each tuft, then anchoring each tuft to the core with evenly-spaced heavy-wire staples driven through a continuous steel channel. According to the manufacturer, the jointless steel core, the measured, looped filaments, plus the uniform weight and balance of brush material afford maximum resistance to disintegration at high speeds.

The wheelbrush is available in 6, 8, 10, and 12-inch sizes, filled with wire of oil tempered, high tensile, crimped or stainless steel, brass, or nickel. The wire is supplied in commonly - used gauges, and all brushes may be used offhand, mounted on flexible shafts, fixed on brushing machines, lathes, and motors, or ganged on special machines when a wide brushing surface is required for the job at hand.



Fullanchor Wheelbrush

A turn of the hand is all that is required for instant speed adjustment on your machinery. Changes in production schedules, operator speed correction or specification variations are accomplished without loss of time or labor. Sizes from fractional to 8 h.p. Ratios from 3 to 1.

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The Better Way
To Heat Treat High Speed Steel!

SENTRY MODEL YP
Vertical model for long, slender drills, reamers broaches, etc.

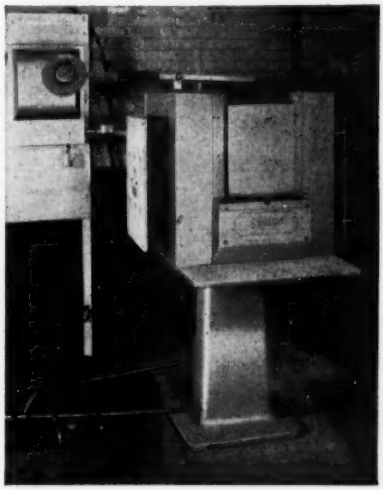
SENTRY MODEL 2Y
For small tools, cutters of moly, tungsten and cobalt high speed steels.

GEOMETRIC *Proves Sentry Efficiency*

Like many top industrial plants, GEOMETRIC TOOL COMPANY DIVISION, Greenfield Tap and Die Corporation, New Haven, Conn., had heard of the efficiency, economy and quality of Sentry heat treating . . . they decided to give a Sentry furnace a trial.

Again, as in so many instances, actual performance proved Sentry's claim of larger economy and high quality. Geometric is now using Sentry on a standard production basis.

Request Catalog G-1



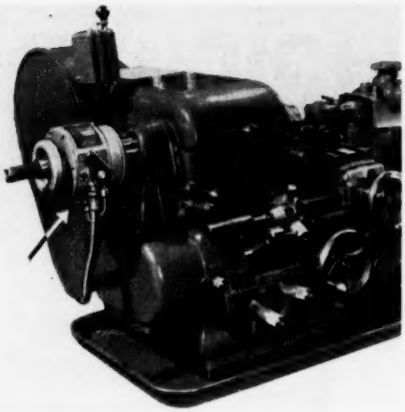
Sentry Model Y Furnace at Geometric Tool Company Division, Greenfield Tap and Die Corp., New Haven, Conn.

THE SENTRY COMPANY

INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS

Air Collet Closer Provides Non-Stop Lathe Production on First or Second-Operation Work

Durable Products, 816 W. 50th St., Minneapolis, Minn., has announced the Wilson Air Collet Closer which is said to provide non-stop lathe production on first or second operation work with a maximum bar stock capacity of 1 inch. According to the manufacturer, the unit is consistently accurate because of controlled pressure on the work, and automatic adjustment for variations in stock or parts is provided. Adaptable to both production and toolroom operation of a lathe, the closer uses any standard draw-type collet and step chucks.



Wilson Air Collet Closer installed on a lathe

The unit is available with foot or "finger-tip" control ond includes a wearless, neoprene inner tube to prevent leaks. All load is carried by two thrust and radial load bearings.

Tungsten Carbide Grade for Rough Turning Steel and Armor Plate

Adamas Carbide Corp., 1000 S. Fourth St., Harrison, N. J., has developed a tungsten carbide premium grade, designated as Grade 434, which

QUALITY ACCURACY COLLIS DURABILITY SERVICE

USE-EM-UP TYPE

STANDARD TYPES

SLEEVES
AND
SOCKETS
AND A
complete line of COLLETS

• COLLIS Taper Tools are made by men skilled in this type of manufacture. Users get long satisfactory service from COLLIS Equipment and find the answer to all drilling, reaming, and tapping needs in the COLLIS line. We can give prompt service on orders for Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as on Sleeves and Sockets and Collets.

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ADJUSTABLE STEP BLOCKS
STAR TYPE HAND KNOBS
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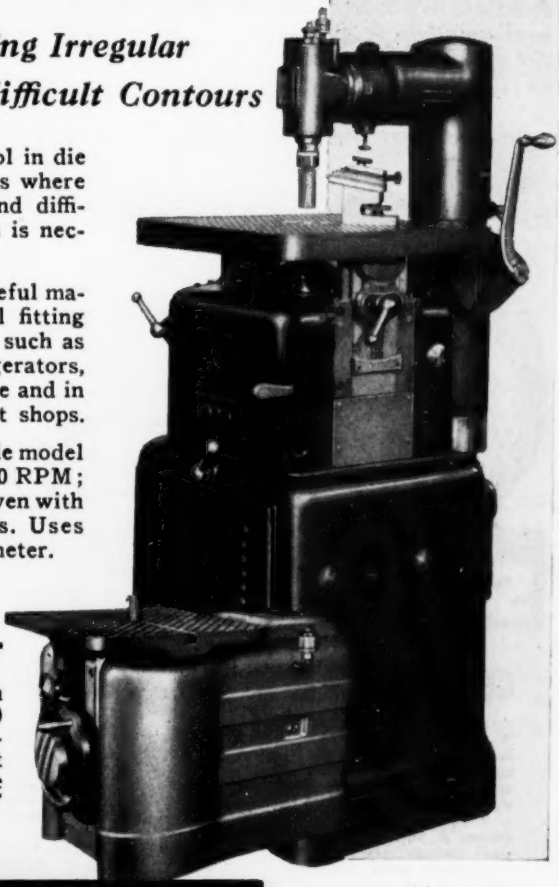
Northwestern
119 HOLLIER AVE., DAYTON 3, OHIO

Boyar-Schultz

No. 2 PROFILE GRINDER

. . . for grinding Irregular Shapes and difficult Contours



A standard machine tool in die shops and in tool rooms where grinding odd shapes and difficult, irregular contours is necessary.

It is a particularly useful machine for grinding and fitting large dies and punches such as forming dies for refrigerators, table tops, sanitary ware and in automotive and aircraft shops.

Spindles in dual spindle model illustrated, turn at 10,000 RPM; stock removal is rapid even with small diameter wheels. Uses wheels ¼" to 3" in diameter.

No. 1 Profile Grinder

A bench model with spindle speed of 20,000 RPM. Performs in minutes, many jobs that would ordinarily require hours. Uses wheels ⅛" to 1" diameter.

BOYAR-SCHULTZ Corporation

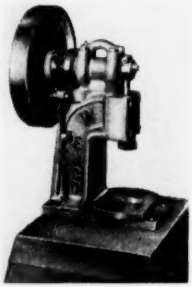
2120 WALNUT STREET, CHICAGO 12, ILL

WRITE FOR LITERATURE FULLY DESCRIBING THESE TIME SAVING MACHINE TOOLS

was originally designed for the rough turning operations of shell manufacturers but which is said to be ideal for rough turning of all types of steel and armor plate. The grade, it is claimed, has also been used on centrifugally cast 309B stainless steel. According to the manufacturer, feeds ranging from 0.015 to 0.068 inch per revolution and speeds from 68 to 600 s.f.p.m. have been tried successfully, with a depth of cut from ⅛ to 1¼ inches. Grade 434 is not recommended for light finishing operations.

Redesigned Punch Presses Afford Increased Die Space

The Klaas Machine & Mfg. Co., 4314 E. 49th St., Cleveland 9, Ohio, has announced that the Emco line of bench-type power punch presses has been redesigned to afford increased die space or "window height" by eliminating the radius in the column. Also, a new clamping device, consisting of a tool steel block end bolt, has been introduced in the ram to provide a more rigid grip and to do away with the need for set screws.



Emco Improved Model W Bench-Type Power Punch Press

The Emco press is available in two models; namely, Model W with a standard ¾ and 1¼-inch standard stroke and the Model X which is provided with a 1½ and 2-inch stroke.

Specialize

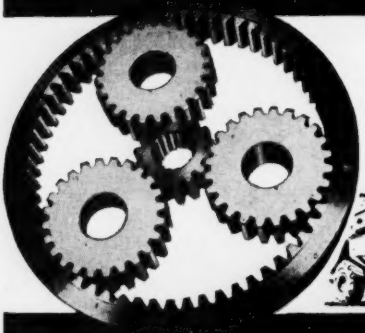
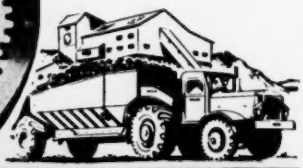


Photo shows planetary gear system used in Euclid Road Machinery's 24 or 40 ton coal haulers.



Standardize

GEARS OHIO REDUCERS

● Ohio Gears are at work in all their glory when operating for Euclid Road Machinery, world's leading manufacturer of heavy duty coal haulers and earth moving equipment. Here's where gear engineering, strength and durability meets its test, on long hauls, up and down steep grades, forward and backward over broken terrain, at any angle, pushing and pulling 25 or 40 ton loads on 4 wheel planetary gear drives, at various speeds, tensions and stresses. All this on Ohio Gears, every day, year in and year out, with engineering in every ounce of metal and every measurable gear dimension . . . Euclid Road Machinery demands dependable gears. Perhaps your products need such mechanical insurance. See our nearest distributor or write direct.

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THE OHIO GEAR COMPANY
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OHIO GEARS

With Carb-O-Plating the wear-resistant advantages of tungsten carbide are provided for parts which could not be produced from solid carbide or where, if the solid material was used, costs would be prohibitive.

In the case of core rods used in the powder metal industry, a part of the size illustrated would be highly expensive if produced of solid carbide. By Carb-O-Plating a steel core rod, an ideal combination of advantages is obtained—the part cost is low; the steel core provides toughness to resist shock; the tungsten carbide coating gives excellent wear resistance.

Parts such as the air gage mandrel shown could not be made of solid carbide because of machining problems to be encountered. Here Carb-O-Plating provides carbide life for all wearing surfaces. Carb-O-Plating may be the cost-saving answer for your wear-resistant parts. Let us send you full information.

THE PLUS IN PRECISION

Lincoln Park **INDUSTRIES, INC.**

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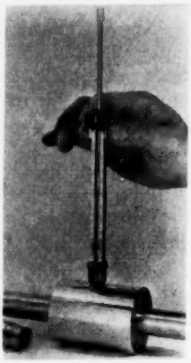
DESIGNERS AND MANUFACTURERS OF: SPECIAL AND STANDARD CARBIDE CHROME PLATED AND STEEL GAGES CARBIDE ROTARY FILES • ALSO FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION.

Pocket-Size Hardness Tester Operates on Rebound Principle

Designated as the Sklerograf, a pocket-size hardness tester which operates on the rebound principle and which is designed specifically for on-the-spot testing by engineers, metallurgists, foremen, and superintendents has been announced by Kurt Orban Co., Inc., 205 E. 42nd St., New York 17, N. Y. The instrument is provided with a tubular nickel container for ease of carrying on the job. In operation, the instrument is placed in a vertical position on top of the article to be tested, and the rebounding bar, which carries a hardened steel ball point, is raised until held in place by a locking device. When the locking device is released by pressing a catch, the bar falls and rebounds to a point corresponding to the hardness of the object, where it is retained. Hardness, it is claimed, can be read within an accuracy of one point Rockwell C.

The instrument is available in two models; namely, Model M which is 6½ inches long x ¾ inch in diameter and which is suitable for use by engineers and metallurgists, and Model D, a larger type intended chiefly for use by



Sklerograf Pocket-Size Hardness Tester in use

best choice . . . . productionwise!

• Ready Tool Company is the world's largest manufacturer of precision engineered centers . . . all exclusive developments of RED-E engineers. Varied sizes, tapers and shanks for EVERY NEED . . . guaranteed to reduce operating costs, increase production, eliminate maintenance. Write for literature.

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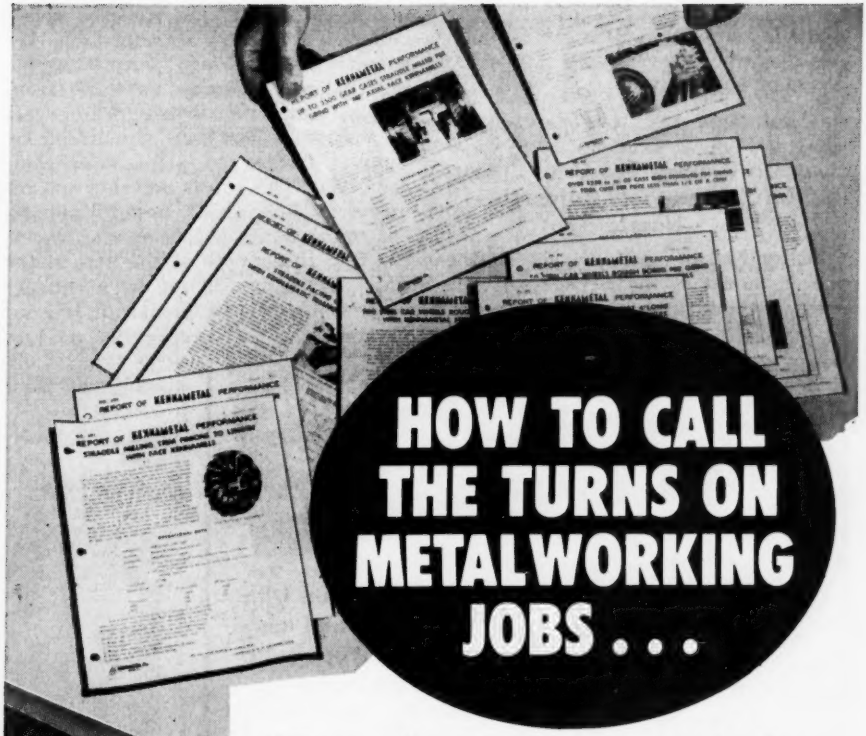

HOW TO CALL THE TURNS ON METALWORKING JOBS . . .

Ability to predict with a high degree of certainty the results obtainable from a cutting tool is a worthwhile asset —developed through knowledge and experience, acquired either firsthand or from other users of known repute.

It's a satisfaction to know beforehand that the tool chosen for a job will turn out well—has inherent properties that assure consistently good performance.

Foresighted metalworkers have learned to rely on Kennametal. It is noted for doing one good job after another, day in and day out, as demonstrated by scores of regularly-issued Performance Reports.

Our accumulated knowledge and experience on how to "call the turns" on a wide variety of applications is yours for the asking. Our Field Engineers will be glad to help you. Kennametal Inc., Latrobe, Pa.

KENNAMETAL
CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

foremen and superintendents. The Model D leaves a small indentation on the surface, whereas the Model M leaves no indentation.

Carbon Dioxide Powered Spray Gun Features an Adjustable Nozzle

Designated as the Model "53," an improved model of the Becker self-contained carbon dioxide powered spray gun which features an adjustable, removable nozzle which permits adapting the unit to spray anything from paints to insecticides, from a fine mist to a stream, has been announced by Sullivan-Becker Co., Dept. 453D, Kenosha, Wis. The gun is portable and requires no compressor, hose, or electrical connections. A special attachment fits into the handle of the gun so the unit can be pressurized by a conventional air line for spraying solutions which will atomize at low pressure.

The gun incorporates a spraying head of cast aluminum, a 21-oz. container of heavy gauge steel, and inserts of brass and stainless steel. According to the manufacturer, the gun is easy to reload, and accessory nozzles can be substituted even while the gun is charged.

Becker Model "53" Self-Contained Spray Gun

Free! BARNES HANDBOOK on HACK SAWING and BAND SAWING

Profusely illustrated with photos, charts and diagrams and loaded with technical data and explanatory sketches, Barnes Handbook of Metal Sawing is a must in every shop using Hand or Power Hack Saws and Band Saws.

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W. O. BARNES CO., INC.
DETROIT 14, MICHIGAN

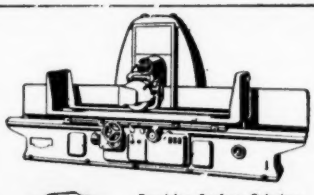
MATTISON GRINDERS

If its a Flat Surface to Grind
There's a Mattison to Grind it.

● With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

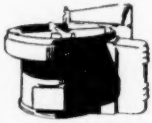
For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.

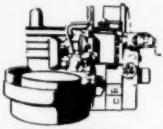


Precision Surface Grinders Horizontal Spindle

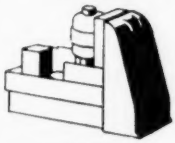
Disc Grinders, Double Spindle Type



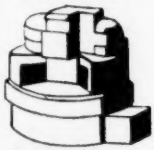
Vertical Spindle Disc Grinders



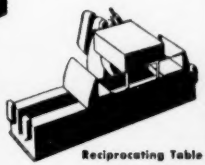
Plano Grinders, Rotary Table Type



Rotary Table Surface Grinders

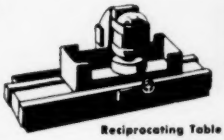


Automatic Rotary Surface Grinders

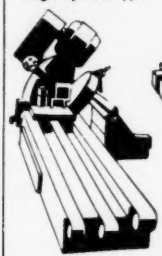


Reciprocating Table Face Grinders

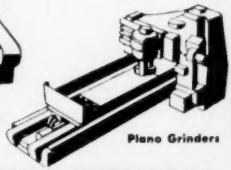
Disc Grinders, Single Spindle Type



Reciprocating Table Surface Grinders Vertical Spindle



Face Grinders, Traveling Wheel



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900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder

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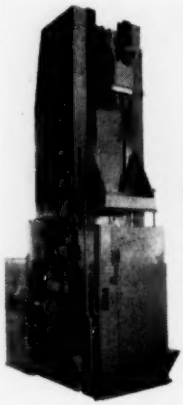

Acme V-20-60 Vertical Internal Pull-Up Hydraulic Broaching Machine

The machine is available in a variety of sizes ranging from 6-ton capacity and 36-inch stroke up to 30-ton capacity and 60-inch stroke.

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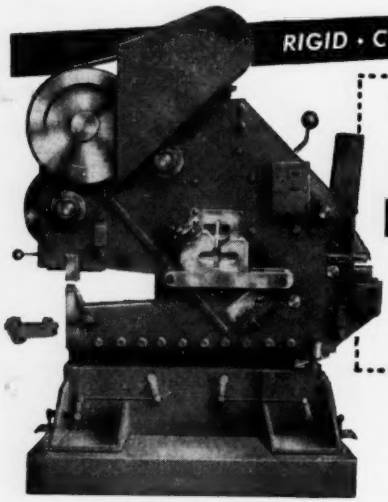

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Shears Plates	7/16"	1/2"	5/8"
Shears Flats	3-3/16" x 9/16"	3-3/16" x 5/8"	4" x 3/4"
Shears Angles (Square Cut)	3 1/8" x 5/16"	4" x 3/8"	5" x 1/2"
Shears Tees	3 1/8" x 5/16"	4" x 3/8"	4 3/4"
Shears Round	1-13/16"	1 3/8"	1 3/4"
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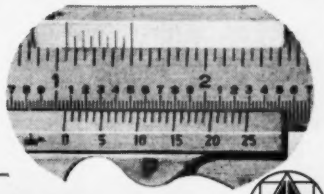

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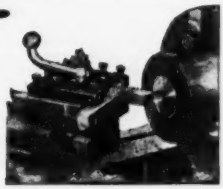
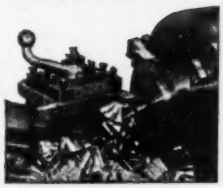
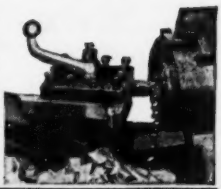
The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.



3/4" square tool bit mounted in Model 4½-S turret used for facing cut.



Same tool used for broadface turning merely by indexing turret one position or 30°.



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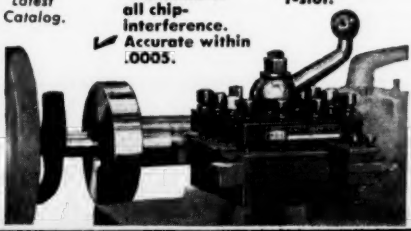

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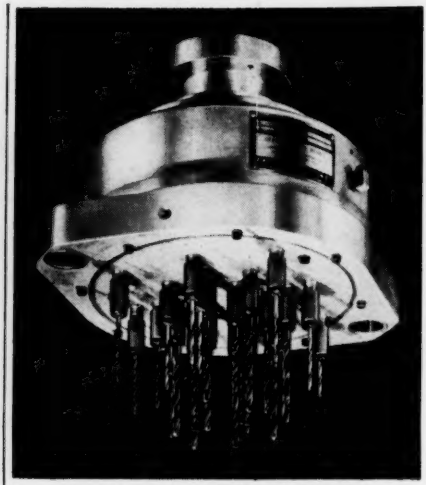

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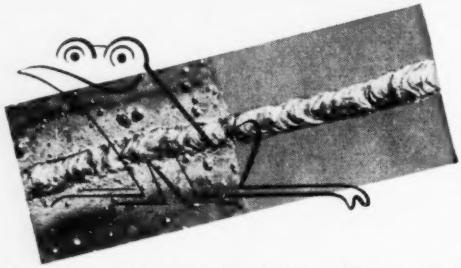

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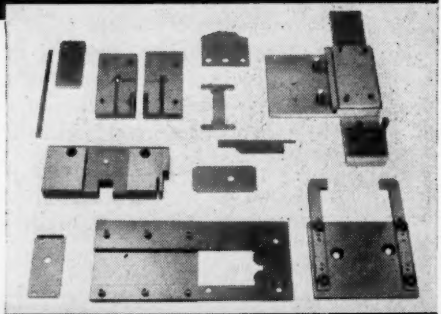

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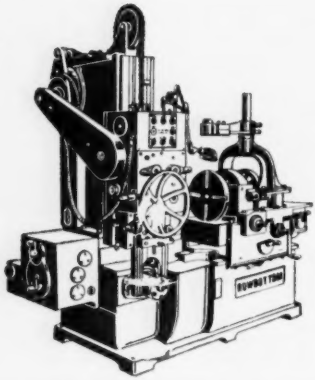

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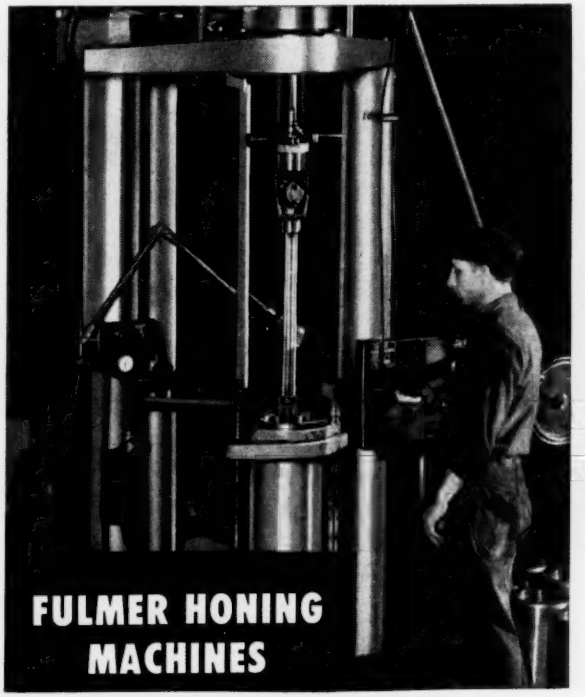

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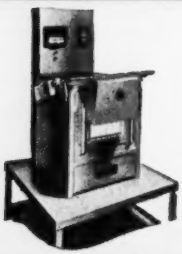

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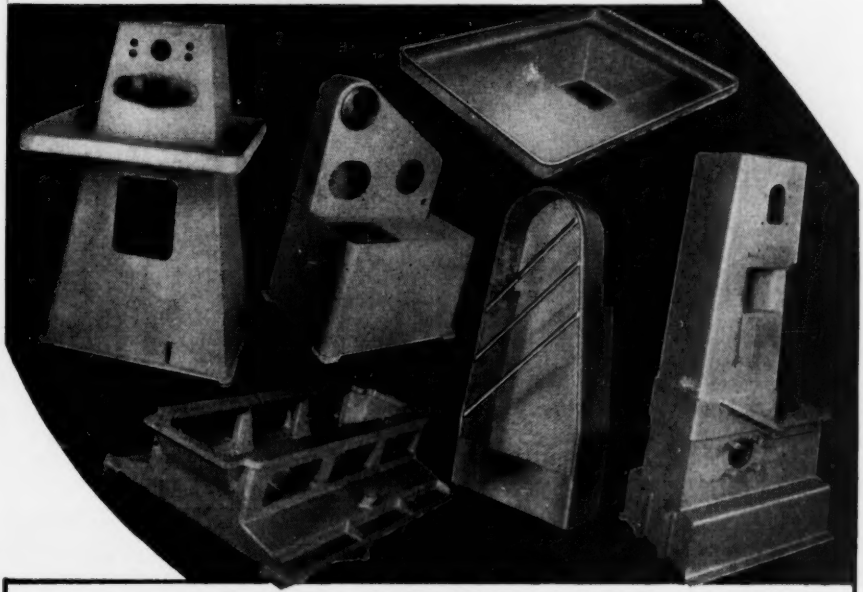

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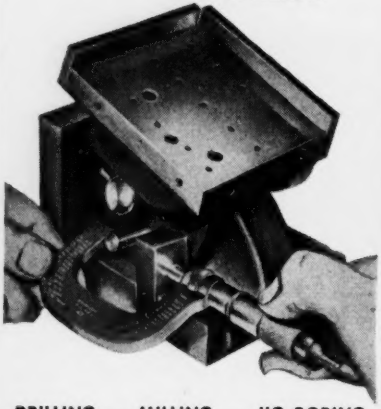

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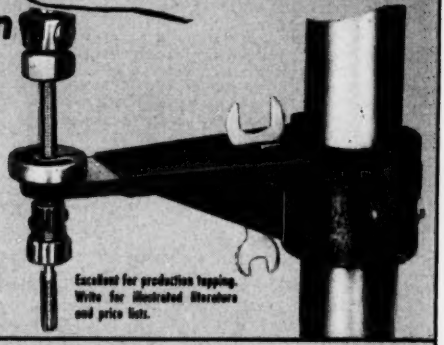

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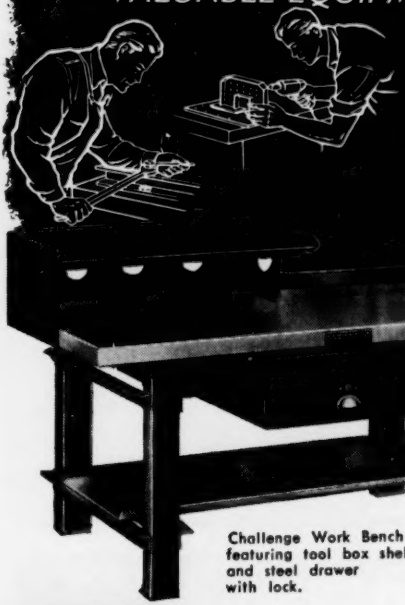

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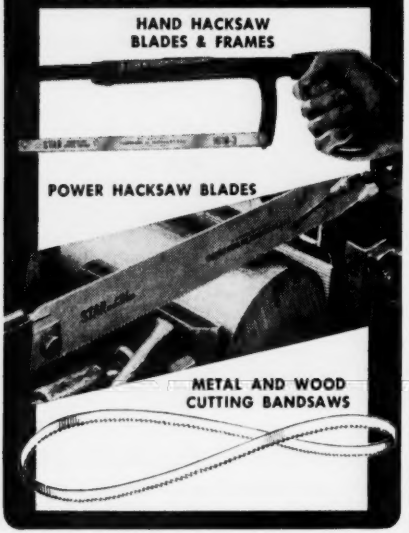

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4" x 1½" Square

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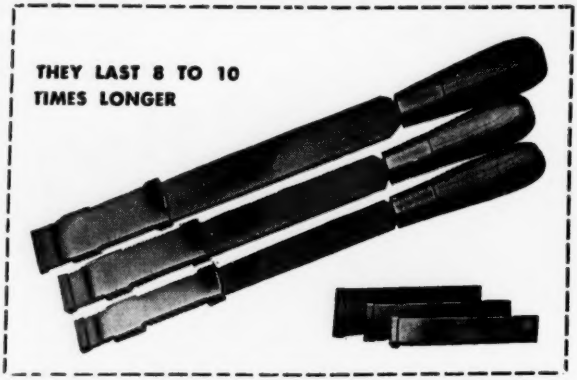
Available in three widths



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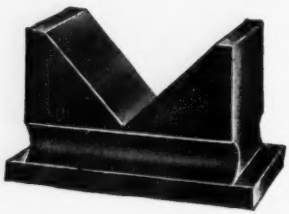
SEMI-PRECISION "V" BLOCKS

for all-around shop use



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ONE MAN...
bends 2" x 2" x 3/16"
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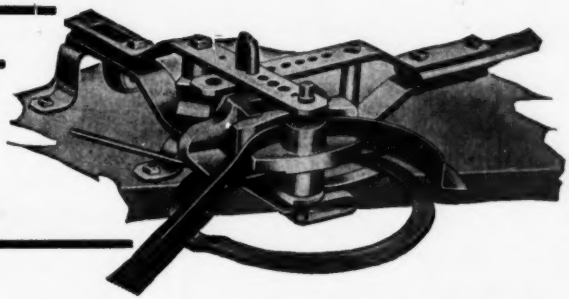

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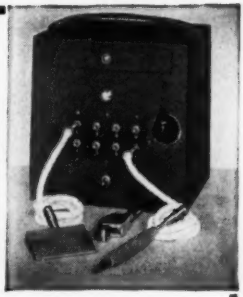

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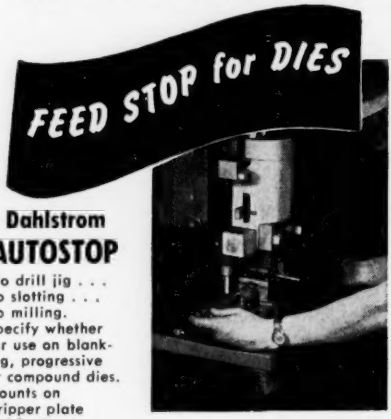

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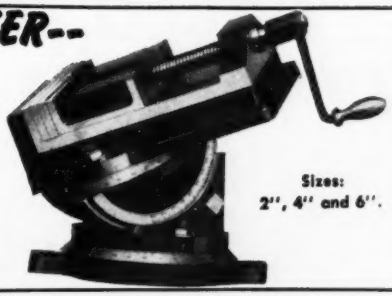

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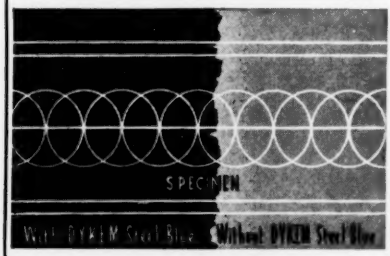

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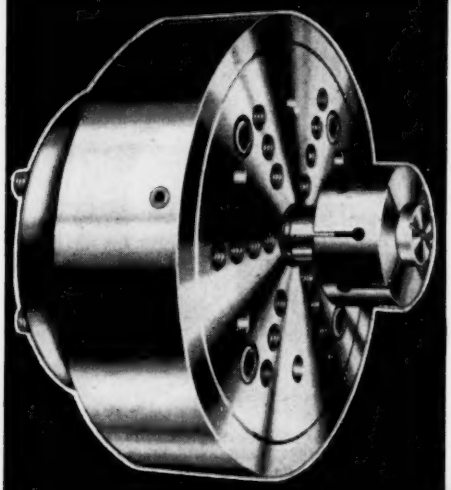

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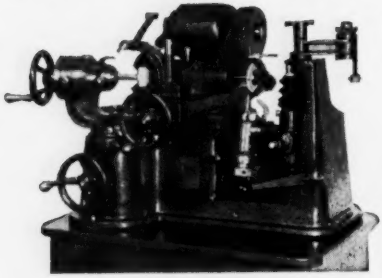

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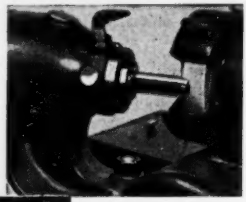

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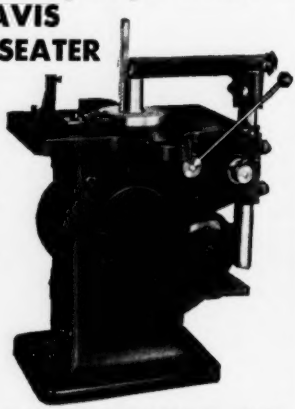

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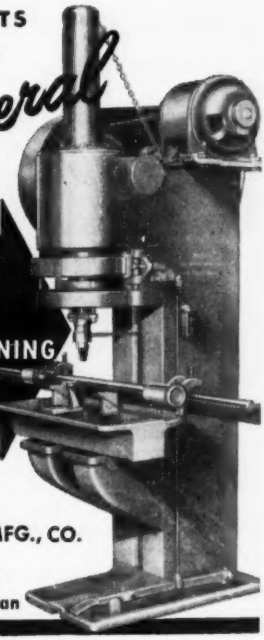

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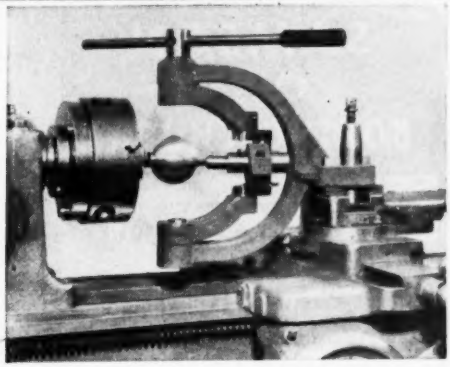

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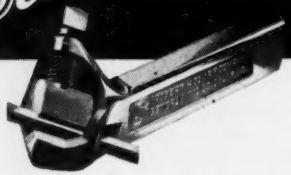

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Can furnish rack from almost any size blank and pitch as well as length to form continuous sections.

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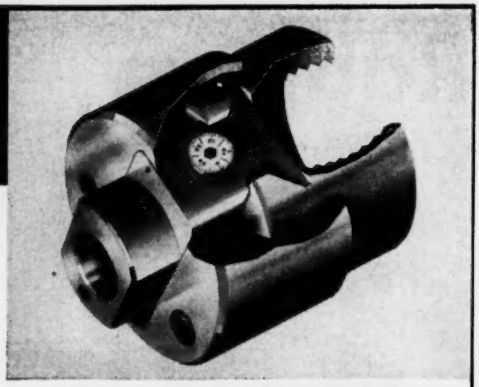

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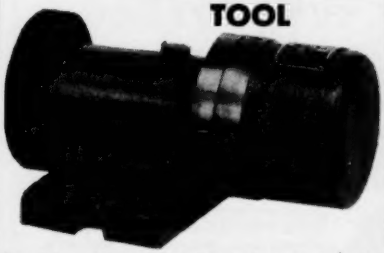

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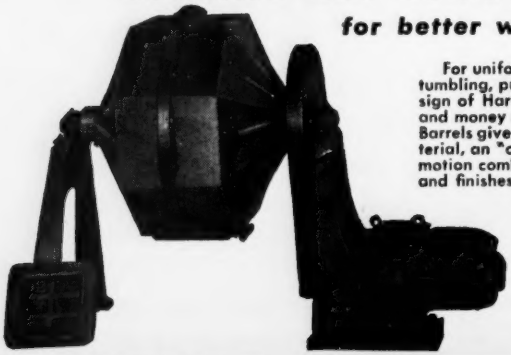

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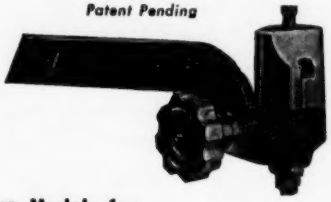

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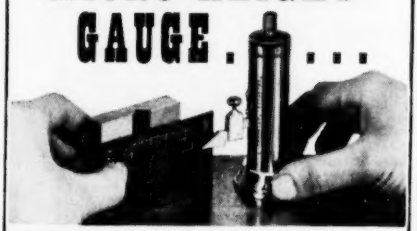

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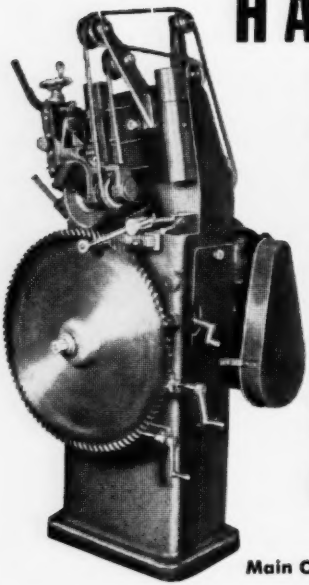

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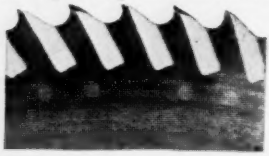

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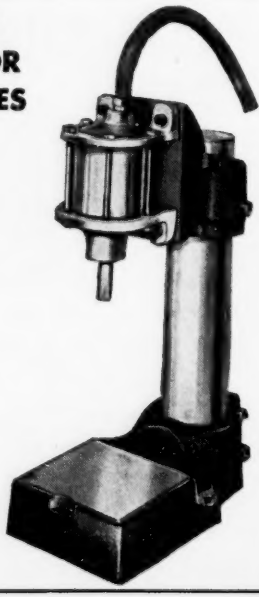

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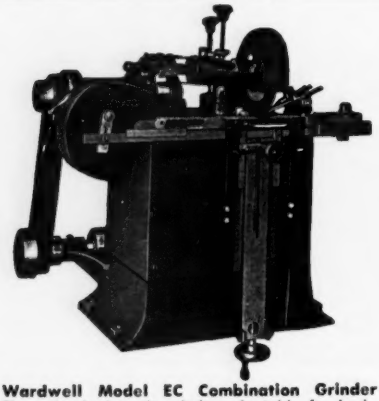

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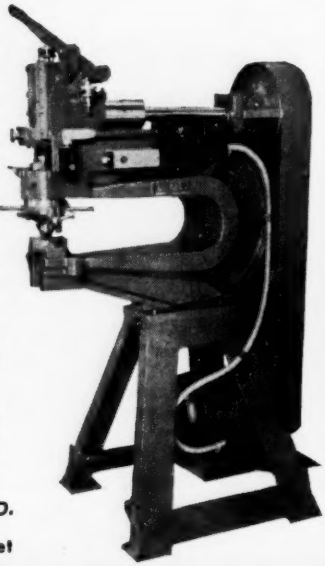

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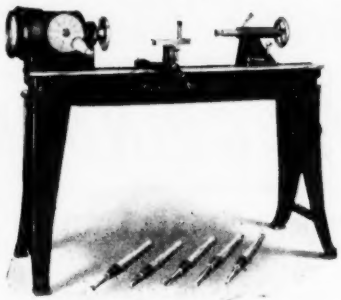

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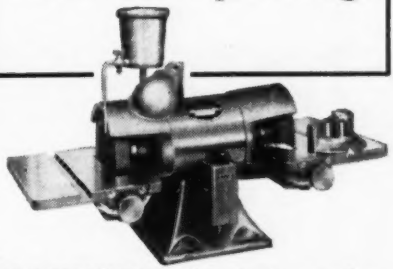

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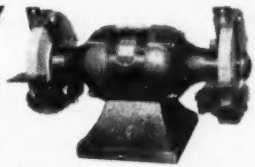

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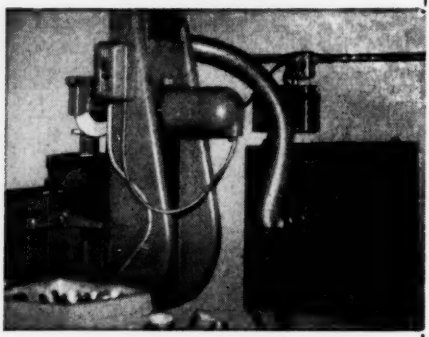

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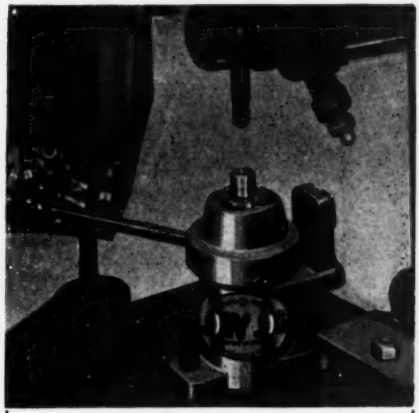

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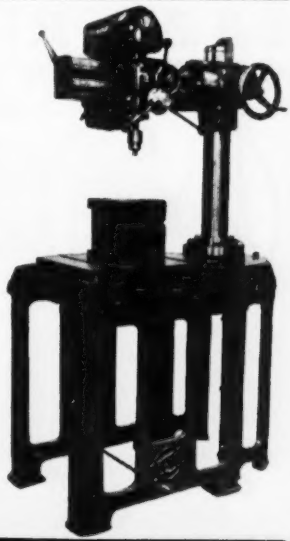

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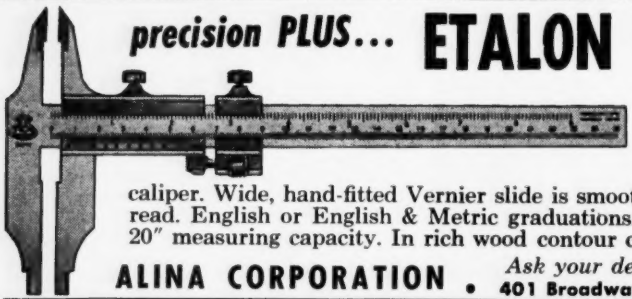

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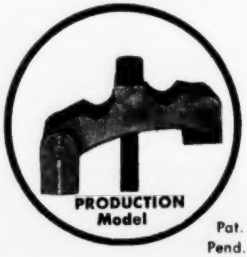

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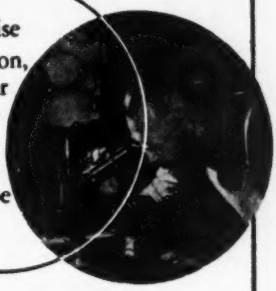

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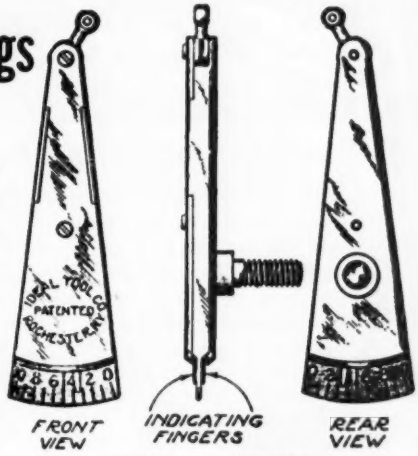

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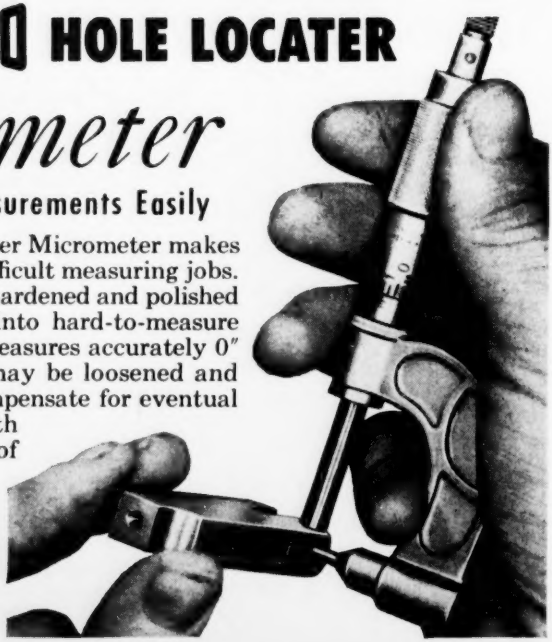
Makes Difficult Measurements Easily

● The Tumico Hole Locater Micrometer makes easy work out of many difficult measuring jobs. Note the round, ground, hardened and polished anvil which slips easily into hard-to-measure spots, holes and tubes. Measures accurately 0" to 1" in 1000ths. Anvil may be loosened and turned or replaced to compensate for eventual wear. A real time saver with 101 uses. Write for name of nearest dealer.



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Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

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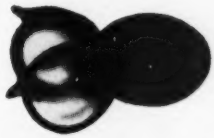
Highest quality lenses, precision ground and polished, made by Bausch & Lomb, world leader in optical quality and value. Lightweight, extremely durable 1, 2 and 3-lens magnifiers ranging in power from 3X to 20X. These are in the complete line of industrial magnifiers stocked by your industrial supplier, manufactured by Bausch & Lomb Optical Co., 50521 Bausch St., Rochester 2, New York.



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What does it mean to you not to have to wait for punches and dies while they are being made to order but to get them right off our shelves?

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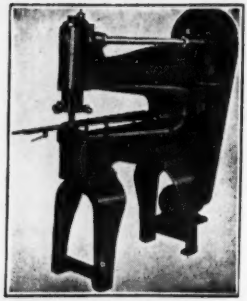

CAPACITIES UP TO 3/4"

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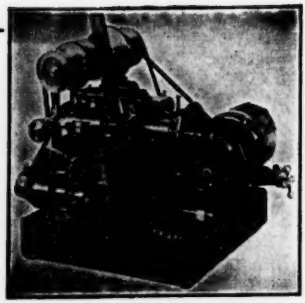

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with revolving cutter will make 1, 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1½" dia. Blanks are held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut.

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WICACO CONTINUOUS OIL GROOVER cuts grooves of all descriptions, internal or external, continuous or intermittent.

Send us samples for grooving. We will return them cut to specifications, with a record of time and cost estimate. No obligation.

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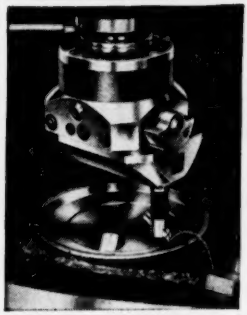

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Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; nine models for work up to 36¼" diameter.

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SELECTIVE NUMBERING HEADS

Press Style Model 83

All wheels • QUICK SET

Model 83 Heads for all stamping operations requiring quick selective numbering. Wheels engraved with direct sight figures at front of machine. Set to the required character by turning the knobs. By pushing the knobs right or left anyone of the wheels may be engaged. Indexed wheel selector knob serves as a positive stop for every wheel. 1/16" to 1/4" size figures. Letter wheels, with up to 11 letters and a blank on each wheel can also be supplied. Heads are more efficient and durable than old style lever machines. Furnished in sizes from 1 to 15 wheels. Bulletin MS83.

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Steel Type

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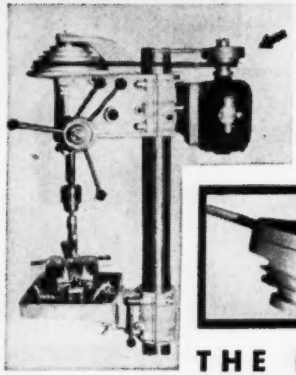
New "PULL-GEAR" SPEED-REDUCING PULLEY Increases Drill Press Capacity

NEW MODEL
Provides Correct Speed and Power to Drill Up to 1 3/8" with 1/2 H.P. Motor



Amazing new internally geared speed reducer doubles drill press capacity. Greater power, greater efficiency, greater productivity.

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Some Territories Open to Jobbers

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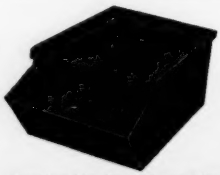

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THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

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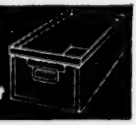
Quality Handling & Storage Equipment



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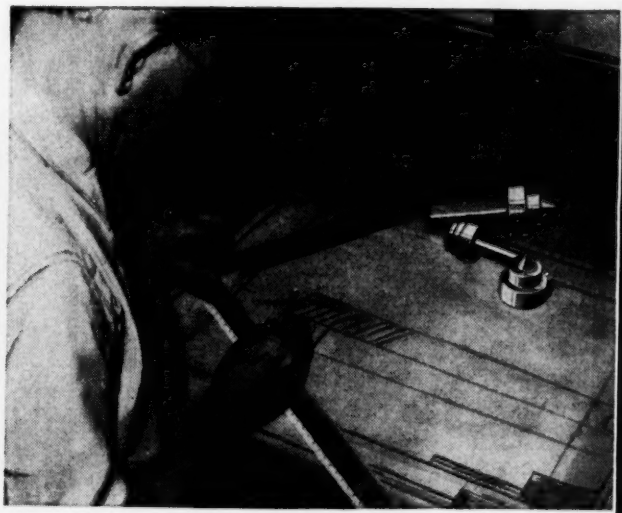

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Engineered Live Centers . . A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

Precision LOW-COST LAPPING with Production Speed!

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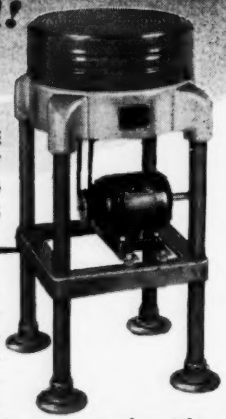
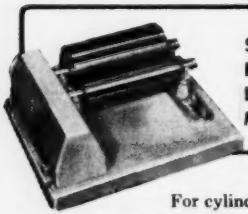


Designed for accurate lapping any material where a perfectly flat surface is important. Finishes to extremely close tolerances are produced.

The perfectly flat surfaces of sliding and rotating parts, air and liquid tight seals, plastic and die casting molds are quickly accomplished with this machine tool.



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For cylindrical lapping, giving an accurate, mirror-like finish in less time than any other method. Ideal for plug gauges. Saves as much as ⅔ in lapping time.

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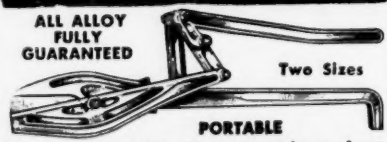

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No. 1 cuts up to No. 11 gauge strip or sheet
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CO2 POWERED INDUSTRIAL
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NEW!

IMPROVED FOR INDUSTRY!

- ✔ Nozzle removes without pressure loss
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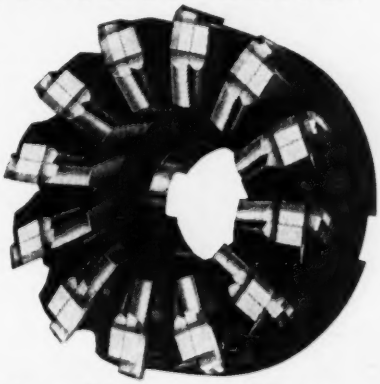
APEX INSERTED-BLADE METAL-CUTTING TOOLS

Here's a PRODUCTION Cutter
for your
HEAVY DUTY JOBS



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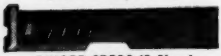
FINGER STOPS (3 Sizes)

STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on.
GARBERDING FINGER STOPS made in uniform width to fit any standard width slot. Just grind ends to fit.
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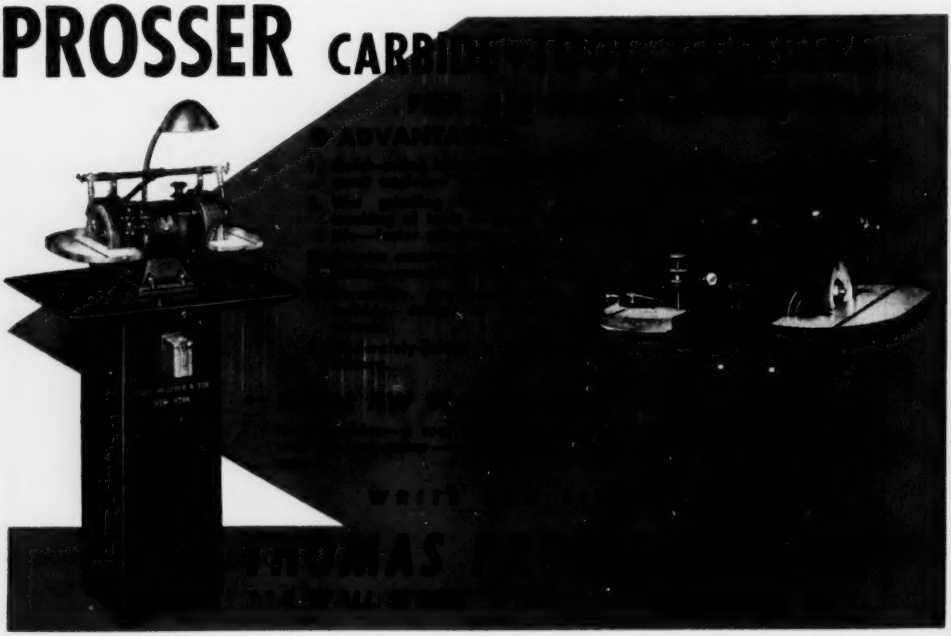

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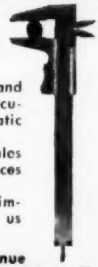
MODEL 50E



6" scale—Hardened Jaws—.001" and 1/128" verniers — Guaranteed Accuracy! Finest model With automatic thumb lock.

Model 55A in inch and metric scales with set screw . . . also $8.75. Prices F.O.B. New York.

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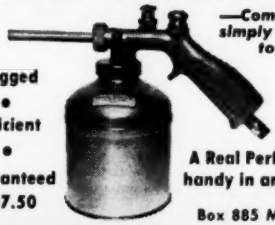

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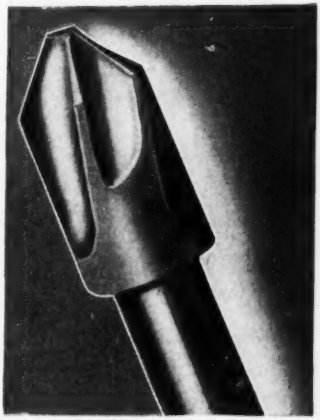

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Six staggered cutting edges give shearing cut that eliminates all chatter.
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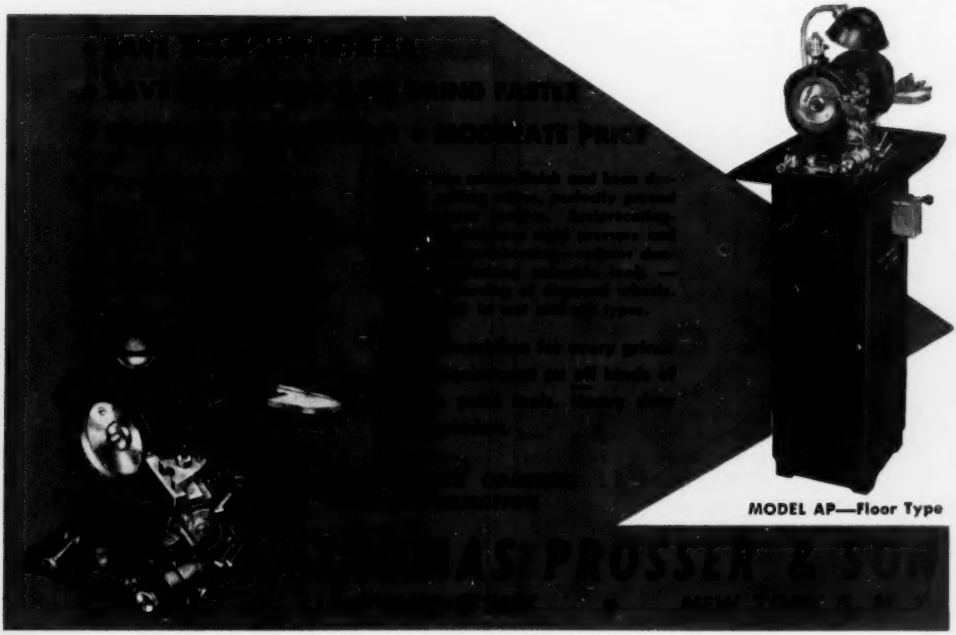

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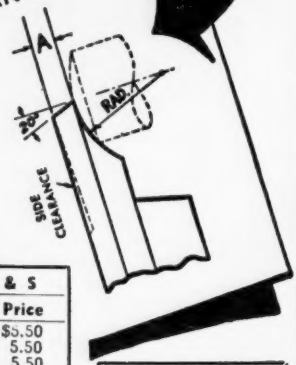

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1/8	5.50
5/32	5.50
3/16	5.50
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1/4	5.50
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3/8	6.00
13/32	6.25
7/16	6.25
15/32	6.50
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ORDER BY RADIUS AND MACHINE SIZE

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These H.S.S. tools assure uniform, correct radii, better finish and appearance, less set-up trouble and maximum production at lowest cost. Complete line of Standard Screw Machine Form Tools.

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MICRO-MINIATURE

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The Model A Kaufman Tapper

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Send prints and sample of your work for further information and recommendations on how Kaufman Tapping Machines can reduce your production costs.

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KAUFMAN MFG. CO.

Manitowoc • Wisconsin

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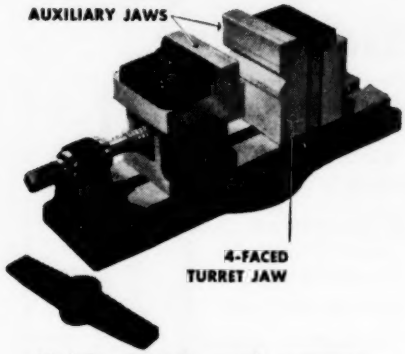

Holds round, oval, square, octagonal, rectangular, flat and angular work without special jigs

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Quality is improved because husky vise (it weighs 96 lbs.) holds work tight. Jaws open to 9½ inches. Clamping flange surrounds entire vise.

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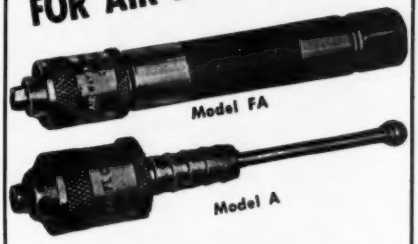
THE VALVE WITH THE INTERNAL FULCRUM LEVER

FOR AIR AND LIQUIDS



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Ingenious lever arrangement makes conventional packing stem and gland unnecessary. Saves air. Saves maintenance.

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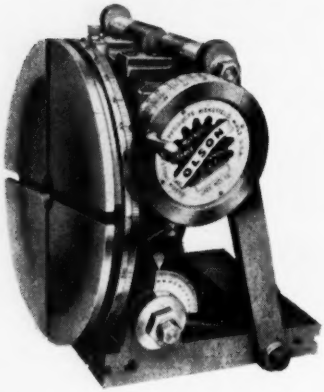
Olson

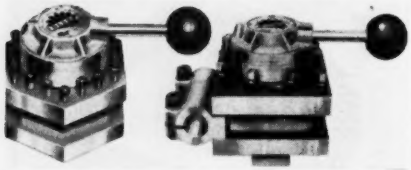
COMBINATION ROTARY TABLE and ANGLE PLATE



A rugged, precise, dual purpose tool used as an angle plate with worm adjustable from 0 to 90° . . . and as a worm-driven rotary table with vernier control to within 2 seconds of arc.

WRITE FOR FOLDER

"WEDGE-LOCK" TURRET



Does not raise up when indexing in all 12 positions. 4-way and 6-way block models. Repetitive accuracy to within .0003 plus or minus within itself.

WRITE FOR FOLDER

MAKERS OF HELICAL GEAR SPEED REDUCERS, SINGLE AND DOUBLE REDUCTION. ALSO SPECIAL GEARS OF ALL TYPES.

Open territory available to representatives

OLSON INDUSTRIAL PRODUCTS, INC.
40 W WATER ST • WAKEFIELD MASS

UNIVERSAL CHUCKS

save time
save money

- low first cost, due to simple design.
- wrap-around gripping action eliminates scored tool shanks.
- precision manufacturing assures tools running true.
- sizes from 1/16" to 1½", shanks to fit any type machine.

Standard Collet Chucks for a wide variety of applications.

Floating Chucks for reaming and tapping.

Coolant-Fed Chucks for deep hole drilling.

UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 9, MICHIGAN

173-B

COLLET TYPE PIN GAGE HANDLE

Bushings for cylindrical and thread plug gages.

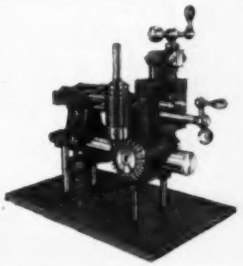
RED **GREEN**

Complete line of gage supplies, handles, blanks, ring gage parts, etc. from stock.

HURON MACHINE PRODUCTS INC. 6252 Monroe Boulevard DEARBORN, MICHIGAN

BURR *Portable Shaft* KEYSEATERS

4 models handle shafts 5", 6", 8" and 12" for cutting Woodruff and straight keyways. Can be carried on field trips. Larger models made to specifications. *Write for details.*



JOHN T. BURR & SON, INC.

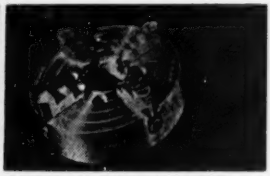
429 KENT AVENUE BROOKLYN 11, NEW YORK

IMMEDIATE DELIVERY FROM STOCK

BURNERD CHUCKS

PRECISION BUILT MADE IN ENGLAND

WITH UNBREAKABLE MEEHANITE BODIES



SELF CENTERING GEARED SCROLL

Nickel Chrome Steel Pinions and Scroll, Semi-Steel Body, Universal Three Jaw, Two Sets of Jaws, Three Pinions.

Model	Size	Wt. lbs.	Price
28	2¾"	2½	$25.00
29	3¼"	3½	26.50
30	4"	6½	30.00
30A	5"	11¾	37.50
31	6"	17¼	45.00
52	7½"	29	57.50
53	9"	43	67.50
54	10½"	62	95.00
55	12"	88	125.00

Universal Four Jaw, Two Sets of Jaws, Two Pinions

Model	Size	Wt. lbs.	Price
29Y	3¼"	3¾	$30.00
30Y	4"	7	37.50
30AY	5"	12½	43.50
31Y	6"	18¼	52.50
52Y	7½"	29	85.00
53Y	9"	42	95.00
54Y	10½"	62	110.00
55Y	12"	88	150.00

Soft Jaws Available

Send for new catalog!

INDEPENDENT CHUCKS

Nickel Steel Operating Screws, Semi-Steel Body, Four Jaw Reversible, Hard Steel Jaws.

LIGHT

Model	Size	Wt. lbs.	Price
35A	3¼"	2¾	$12.50
35B	4"	4	14.00
35C	4½"	5	18.50
36	5"	7½	21.50
34	6"	10	22.50
37	8"	18¼	34.50

HEAVY

40	8"	36	$49.50
41	10"	60	58.00
42	12"	85	69.00
43	14"	104	79.00
44	16"	138	91.00

DE WITT EQUIPMENT CO.

136 Lafayette St., New York 13, N. Y. • WA 5-4048

NEW SHOP LITERATURE

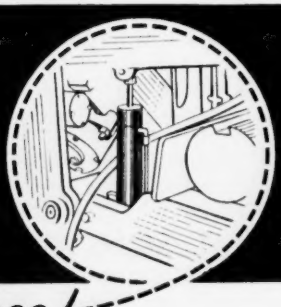
Pedestal Grinder. A six-page two-color bulletin (5305CD) distributed by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., illustrates and describes in detail a pedestal tool grinder featuring a V-belt drive to the ball-bearing spindle, as well as built-in illumination.

Jig and Fixture Details. Harco Engineering, 12092 Woodbine Ave., Detroit 28, Mich., has issued a 26-page catalog featuring 28 of the most commonly used fixture details and three types of rest buttons, as well as fixture keys, swivel screws, dog point screws, hand knobs, crank handles, alloy steel studs, and so on. Full-scale dimensional drawings to provide the designer with an accurate perspective of the part are included.

Spacers. A 12-page two-color bulletin (No. S-103) released by The Hartford Special Machinery Co., 287 Homestead Ave., Hartford 12, Conn., fully describes and illustrates its 8 and 12-inch Super-Spacers which are said to permit quick and easy setups. The company has also issued a 12-page two-color general facilities brochure which contains complete information on the equipment and skills available for contract manufacturing of a wide range of products.

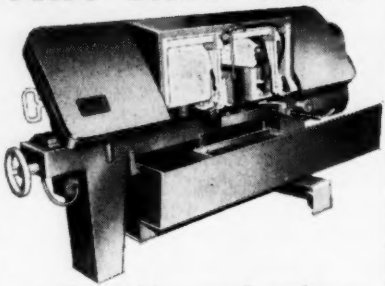
Power Tools. A 52-page two-color catalog (No. 53) released by Boice-Crane Co., 937 Central Ave., Toledo 6, Ohio, describes and illustrates its line of power tools for cutting, shaping, drilling, and finishing metal, wood, fiber, and plastics. The catalog includes information on band saws, contour saws, band filers, drill presses, tool and knife grinders, jig saws, jointers, lathes, planers, belt sanders, drum sanders, spindle sanders, saw jointers, saw tables, shapers, shaper cutters, and other equipment.

You can CUT THIN WALL SECTIONS BETTER



with Kalamazoo METAL CUTTING BAND SAWS

Why? Because Kalamazoo's hydraulic frame control is coordinated with the feed control to give just the right blade pressure for smoothest, most accurate cutting of tubing and thin wall sections. In addition, the saw frame cannot drop accidentally and damage material or saw blade. Yes . . . here's *another* reason why Kalamazoo is synonomous with precision metal sawing at lowest cost . . . *another* reason why it will pay you to specify Kalamazoo Metal Cutting Band Saws. Three models, all available with coolant system and casters.



MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

910 HARRISON ST., KALAMAZOO, MICHIGAN

Straight-Side Presses. The Minster Machine Co., Minster, Ohio, has available two four-page illustrated brochures, one of which contains detailed specifications on single-crank straight-side presses, while the other brochure includes similar information on double-crank straight-side presses.

Automotive Turret Lathe. An eight-page two-color bulletin (No. 151) issued by Potter & Johnston Co., Newport Ave., Pawtucket, R. I., describes and illustrates its 3-U "Speed-Flex" Automotive Turret Lathe which is designed for small precision parts, multiple machining operations, and high speed production. Specifications and dimensional drawings are included.

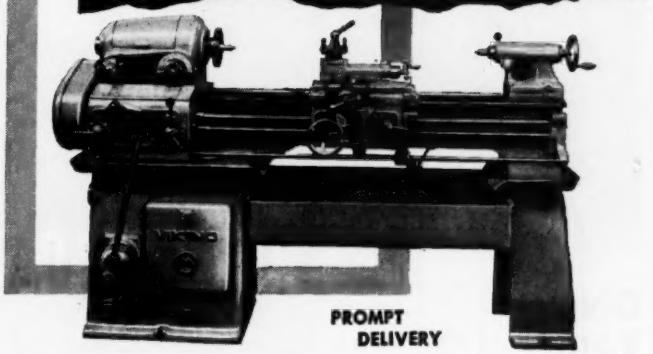
Tap Chucks. A two-color illustrated bulletin (No. 1E) released by Ettco Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y., fully describes its Ettco-Emrick Tap Chucks which are available in three sizes for taps ranging from No. 0 to 1-inch. Data on sizes and capacities, as well as shanks and arbors, are included.

Stamping Manufacturers. The Pressed Metal Institute, 2860 E. 130th St., Cleveland 20, Ohio, has released the 1953 edition of its Blue Book of Stamping Manufacturers. This directory lists the facilities and services of all member companies and also contains a Statement of Policy to Customers which has been subscribed to by all members of the institute.

Friction Clutches. An illustrated engineering data sheet (Form S 31-53) describing Morse Torque-Limiting Slip-Type Friction Clutches which are said to provide overload protection for a variety of machine drives has been announced by Morse Chain Co., 7601 Central Ave., Detroit 10, Mich. The data sheet includes dimensions and capacities of standard 4½, 5½, and 6½-inch diameter adjustable clutches. Tables and specifications of standard Morse Type A plain plate roller chain sprockets are also included in the data sheet, along with other helpful information.

INFINITE SPEED CONTROL WITHIN RANGE

VIKING 13¾" ENGINE LATHE



PROMPT DELIVERY

A patented variable speed unit enables the operator to select any required speed from 35 to 1200 RPM by the movement of a single lever. The headstock is designed with anti-friction bearings and is of rigid construction with hardened and ground spindle. All gears and spline shafts are hardened to insure long life. Measurements are in INCHES AND DECIMALS.

PARTIAL SPECIFICATIONS

Distance between centers	30", 40", 60"
Swing over bed	13¾"
Spindle speeds (RPM)	35-1200
Motor	3 HP

Write us now for complete details.

MOREY ...for machine tools!

MOREY MACHINERY CO., INC.
Manufacturers • Merchants • Distributors
410 BROOME STREET • NEW YORK 13, N. Y.
CANAL 6-7400 • CABLE ADDRESS: WOODWORK, N. Y.

Multiple-Spindle Drill Heads. A four-page two-color circular published by Durant Tool Supply Co., 155 Orange St., Providence 3, R. I., illustrates and describes its line of multiple-spindle drill heads which are available in six different types and in 17 sizes to meet most multiple drilling applications. Specifications are included.

Engineering Data Sheet. Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn., has issued an engineering data form to guide center users in the purchase of the right centers. The engineering data form provides an outline of engineering information needed by the center manufacturer to better enable him to decide which center is best suited for the particular need.

Gear Shaping Process. A four-page bulletin (No. SP-53) released by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., tells where, when, and how the Shear-Speed gear shaping process fits into the economic planning of today's metal-working plant. Basically non-technical, the bulletin is written in telegraphic style for the busy executive.

the General
ROTO-HEAD
makes 1 lathe do the work of many
MAXIMUM CAPACITY 1" O.D.

Give Your PRODUCTION a Lift

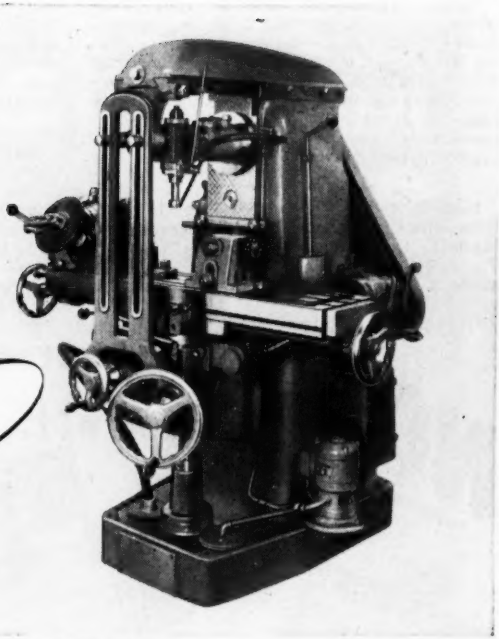
Here's the most important lathe accessory ever developed! ROTO-HEAD is an attachment for converting lathes into fast, efficient, easy-to-operate, semi-automatic screw machines, at nominal cost.
ROTO-HEAD uses the principle of the Swiss type automatic machines and economically produces duplicate parts from bar stock heretofore done only on the more expensive machines.
ROTO-HEAD fits all popular lathes from 9" to 16" swing. Handles all work within lathe capacity.
Send for brochure filled with helpful data.

It's yours . . . so write today.

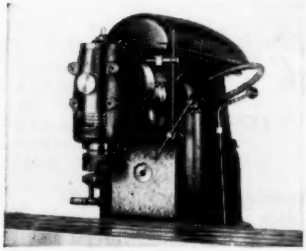
GENERAL ROTO COMPANY
334 E. WASHINGTON • LOS ANGELES 15, CALIF.
RIchmond 7-0158

Tool Inventory. A folder containing basic how-to-do-it information necessary to set up a minimum tool inventory program has been released by Carboloy Department of General Electric Co., 11143 E. 8 Mile Blvd., Detroit 32, Mich. The folder is designed to show toolroom supervisors, managers, and other individuals how to reduce by as much as one-third their tungsten carbide tool inventories.

Horizontal Broaching Machines. A four-page two-color circular (No. 502) released by American Broach & Machine Co., Ann Arbor, Mich., fully describes and illustrates its HDE Horizontal Broaching Machines with capacities ranging from 15 to 60 tons for heavy-duty internal and surface broaching operations. Data on applications and complete specifications are included in the circular.



Swedish Craftsmanship!



Sajo Vertical Milling Attachment

The Sajo "Plain" Milling Machine

the SAJO "UNIVERSAL" MILLING MACHINE

exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standa ds of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ **Standard Equipment includes:**
3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, 1" arbor, arbor support brace.

★ **Extra Equipment:**
Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDENSED SPECIFICATIONS

Table Size	41⅛" x 9¼"
Longitudinal travel: Plain Miller	24⅛"
Universal Miller	27⅛"
Transverse travel	8¼"
Vertical travel	19"
12 spindle speeds	36-1540 RPM
Table feeds	12
Taper in spindle	No. 40 NMT
Main motor	3 HP

Precision anti-friction bearings on spindle and gear shafts
One-piece column and base
Net weight — 2200 lbs.

Write for Catalog

NO PRIORITY —— PROMPT DELIVERY —— ATTRACTIVE PRICE

AUSTIN INDUSTRIAL CORP. 76-H MAMARONECK AVE. WHITE PLAINS, N. Y.
DEALERS IN PRINCIPAL CITIES

Plain Cylindrical Grinder. The Van Norman Co., Springfield 7, Mass., has released a bulletin describing and illustrating its No. 418 Plain Cylindrical Grinding Machine which is designed to provide for fast, economical, close-tolerance, short-run, or production grinding of small parts. Complete specifications and a floor plan are included.

Forced Feed Lubricators. A 12-page three-color catalog (25G) released by Manzel, 315 Babcock St., Buffalo 10, N. Y., fully illustrates and describes the Manzel Model 25 Forced Feed Lubricator which is adaptable to a variety of applications and will force oil of any viscosity against the high steam, gas, and air pressures generally used in engines, pumps, and compressors. Data on dimensions, specifications, and ordering are included.

Angle Plates and Angle Tables. An illustrated bulletin providing complete specifications on a line of heavy-duty swivel angle plates, rotary swivel angle tables, universal adjustable precision angle tables, and multi-angle jigs has been released by De Witt Equipment Co., 136 Lafayette St., New York 13, New York.

NOW greater versatility
greater efficiency

with Wells Metal Cutting Band Saws

featuring an Expanded Range of Cutting Speeds

WELLS NO. 8 WITH WET CUTTING SYSTEM, NO. 5 IS SIMILAR

TO IMPROVE cutting efficiency and production, three models of the Wells Metal Cutting Band Saw line are now available with expanded range of cutting speeds as standard equipment.

The new cutting speeds coupled with such proved Wells advantages as sturdy construction, ease of operation, real dependability and low cost make these machines even more profitable for you to use. Ask your Wells Dealer for full information or write, requesting catalog G-52 giving specifications and design details for all models.

See us at Booth 1615 at the Metal Show

Products by Wells are Practical

Wells

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

808 TYLER ST. - THREE RIVERS, MICH.

"Metal Stampings in Small Lots" is the title of a 24-page brochure now being distributed by Dayton Rogers Mfg. Co., Minneapolis 7, Minn., which describes the exact technique of how precision die-cut stampings are made in small lots. The "know-how" of this patented process is explained in detail with a number of definite representative examples. Four pages are devoted to basic stamping designs with 20 or more piece-parts.

Milling Machines. A six-page catalog (No. 553) released by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., describes and illustrates Jaspar Universal Milling Machines which are equipped with climb rolling attachments for use with tungsten carbide tools. Information on features and specifications are provided.

Only SUPERIOR DIE SETS Give You These 3 Features For Safer Faster Handling

1. SAFETY FLANGE

2. LOCK JAW LIFTING DEVICE

3. E-Z LIFT SLING CHAIN

It's no longer necessary to take needless risks in handling die sets. Risks that might easily injure the hands of skilled die makers, ruin costly dies in process or completed, or even damage press equipment. Safety features of Superior die sets have eliminated all of these dangers and have speeded up the overall handling of sets from the bench to the press. Prove to yourself the merits of these safety features in both small and large die sets.

FREE CATALOG — *Write today for this helpful data on Superior die sets and die makers' supplies.*

SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS.

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Rockford, Ill., Phone 3-3991
St. Louis, Mo., Lucas 1223
Milwaukee, Mitchell 5-6027
Dayton, Ohio, Hemlock 6209
Atlanta, Ga., ATwood 7771
St. Paul, Minn., PRior 6485

Turret Lathe. A four-page two-color catalog (No. 5312) released by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., fully describes and illustrates its 16-Inch Swing 2-H Turret Lathe which has a 1⅝-inch spindle bore with a 1-inch collet capacity. Information on attachments and accessories and complete specifications are included.

Drives. A 56-page illustrated catalog (No. V-1000) issued by Pyott Foundry & Machine Co., 328 N. Sangamon St., Chicago 7, Ill., fully describes its Vee-Tex Drives. The catalog contains necessary selection tables for V-belts and sheaves, as well as dimensional drawings of the various types of power transmission equipment manufactured by the company.

Lubricants. An eight-page two-color bulletin (No. 100) which describes in technical detail the various industrial grades and compositions of "Molykote" lubricants has been issued by The Alpha Corp., 179 Hamilton Ave., Greenwich, Conn. Included is complete technical information on two of the newest grades; namely, "Molykote" Type U, a grease consistency mixture for extreme bearing pressure lubrication at temperatures ranging from minus 40 to about 400 deg. F., and "Molykote-Silicone Type 77, a grease consistency mixture processed with a high grade silicone fluid and stabilizer.

Knurling Tools. A two-color supplementary bulletin issued by Barnaby Mfg. Co., Inc., 74 Knowlton St., Bridgeport 8, Conn., fully describes and illustrates its line of self-closing knurling tools. Data on sizes, dimensions, and prices are included.

"Cutting-Off Wheels" is the title of a 20-page booklet published by the Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio, covering abrasive wheel usage, machine classification, machine and wheel speeds, and wheel mounting. Other subjects, such as techniques and handling of workpieces, are also covered.

ECONOMIZE Morton-WISE
SPECIFY AND USE Morton
STANDARD FIXTURE CLAMPS AND COMPONENTS . . . . . .
A SAVING OF $62.35 ACHIEVED ON THIS JOB
3 REST BUTTONS COST a leading manufacturer $67.00 to make in his own plant. Now, MORTON-WISE, he buys MORTON RB-3 for $1.55 each.
Greater Savings
Achieved on Jig Feet, Rest Pads and other MORTON Standards. Largest selection of types and sizes of Fixture Clamps and Fixture Details in the Industry. Complete Assemblies or Individual Parts. Highest quality of workmanship and materials maintained. Immediate delivery.
STANDARDS can easily be modified to suit your special application.
Write for: Instructive, Illustrative Catalog. Contains full size tracing templates of each product.
Morton
MORTON MACHINE WORKS
2421 WOLCOTT ST. • DETROIT 20, MICH.

Water and Oil Soluble Cutting Fluid. A four-page illustrated bulletin describing applications and methods for use of the Dynatomics water-and-oil soluble metal cutting fluid, Metalloid WOS, is available from the Metalloid Corp., Huntington, Ind. The bulletin also describes the company's modified tool geometry program involving the use of 18-degree relief angles on single point tools in conjunction with the WOS metal cutting fluid.

Portable Power Tools. A 30-page two-color catalog (No. 537) issued by Syntron Co., 309 Lexington Ave., Homer City, Pa., describes and illustrates its line of portable power tools, including electric hammers, electric hammer drills, electric saws, electric drills, electric screw drivers, electric sanders, electric grinders, concrete vibrators, and gas hammer paving breakers and rock drills. Data on various applications and specifications are included.

Milling Cutters and End Mill Holders. Goddard & Goddard Co., P. O. Box 68, Brightmoor Station, Detroit 23, Mich., has issued a 52-page descriptive catalog (No. 2) containing data on its standard solid high-speed steel milling cutters and end mill holders. Covering a recent addition of 147 different sizes to the company's standard mill line, the catalog also contains information on the company's heavy-duty end mill adapter, its auxiliary equipment, and a quick-change shell end mill adapter.

Disc Grinders. A 12-page two-color bulletin (No. 647-2RM) released by Mattison Machine Works, Rockford, Ill., fully describes and illustrates its line of Hanchett Type Double-Spindle Production Disc Grinders which are available in six sizes with disc wheel capacities ranging from 10 to 30 inches. Information on various features, complete specifications, and dimensional drawings are included.

Universal Electric Industrial and Automotive Tools. A 40-page catalog (No. 39-A) released by Thor Power Tool Co., 175 N. State St., Aurora, Ill., presents complete illustrations, descriptions, specifications, and prices on all Thor universal electric industrial and automotive tools, including drills, grinders, hammers, saws, screw drivers, nut setters, sanders, polishers, tappers, nibblers, balancers, and impact wrenches, as well as automotive valve refacers, valve seat grinders, body and fender air hammers, and air impact wrenches. Accessories and attachments available are also shown.

GAMMONS

TAPER REAMERS
for all types of die work

- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

Write for data sheets.

GAMMONS • HOAGLUND CO.
MANCHESTER 2, CONN.
Manufacturers of helical taper pin, chucking, die makers and special reamers.

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DAYTON ROGERS
Manufacturing Company
Minneapolis 7, Minnesota

New York City, Chicago, St. Louis, Denver, Cleveland, Baltimore, Pittsburgh, Milwaukee, San Francisco, Indianapolis, Detroit; Dayton, Ohio; Rochester, N. Y.; Grand Rapids, Mich.; Newton, Mass.

PATTERNS
Wood and Metal — also Match Plates.
For all kinds of castings—large or small.
Estimates on Request.
GENERAL PATTERN WORKS
2231 Buck St., North of Harrison Ave.
Phone MAin 4751 Cincinnati, Ohio

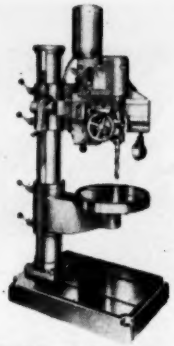
BAKELITE SILENT GEAR SERVICE
ALL SIZE BLANKS IN STOCK.
Teeth Cut To Your Specifications.
Prompt Delivery. *Write for quotation.*
Greaves Machine Tool Co.
division of J. A. Fay & Egan Co.
2700 Eastern Avenue Cincinnati, Ohio

GRIND THE
Eastern Centerless Way
Our new plant with increased facilities assures
PROMPT SERVICE
Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

PRECISION MACHINE WORK
NON-GRAN
CASTINGS • SAND & CENTRIFUGAL

Spun
CASTINGS LAST!
Centrifugally *Spun* Castings offer greater resistance to wear, fatigue, shock and abrasion than ordinary static types.

● Investigate—request booklet! American Non-Gran Bronze Co., Berwyn, Pa.



DEALERS: An Excellent Opportunity
Handle IMPORTED PRECISION TOOLS
Calipers to 80"—Height Gages to 48"

LOW PRICED VERTICAL MILLING MACHINES
RADIAL DRILLS—2 Feet and Up in Stock

***Masters* PRECISION TOOLS**

3613 Archer Ave., Chicago 9, Ill. - - - Cliffside 4-7011
8044 East Ten Mile Road, Center Line, Mich. - Slocum 7-4110
Clover and Jefferson St., Mishawaka, Ind. - Mishawaka 5-3195
2500 Montgomery, St. Louis, Mo. - - - - Garfield 5484

Excellent Opportunity for First Class MILLING OPERATOR—25-35, with good personality and A-1 references to demonstrate and sell outstanding equipment for Milling Machines in New York or Chicago. Car and intimate knowledge of Milling Practice essential. Sales training will be given. Salary, commission and expenses. Mail full particulars to Clarkson, Inc., 320 Ontario Street, Toledo, Ohio.

WANTED

A DISTINCTIVE PRODUCT

Our client, an established New England manufacturer, wants to add one or more products selling through same channels as present line:

1. Small machine tools, such as milling machines or tool grinders.
2. Accessories for machine tools, such as drill attachments, drill heads, dividing heads or adjustable angle plates.

Market acceptance established, sales potential $500,000 a year and up.

Please write referring to advertisement #58.

WELLING & WOODARD
INCORPORATED
52 Vanderbilt Avenue — New York 17, N. Y.

CONSULTANTS IN DIVERSIFICATION AND NEW PRODUCTS

ADVERTISING RATES
for Services Directory
Write Modern Machine Shop
SENT UPON REQUEST
431 MAIN ST., CINCINNATI 2, OHIO

Manufacturing and Development Facilities

for:

COMPLEX FIXTURES AND JIGS
PRECISION INSTRUMENTS
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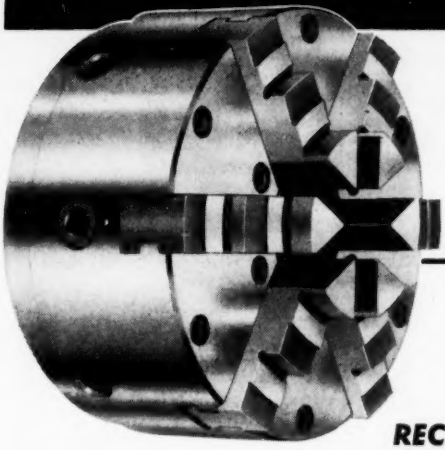

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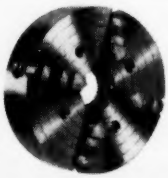

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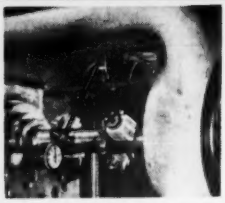

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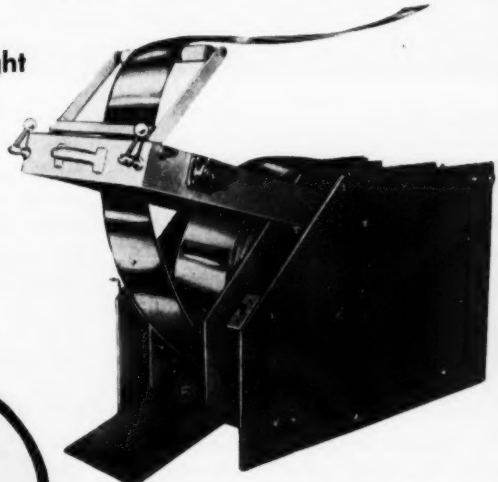

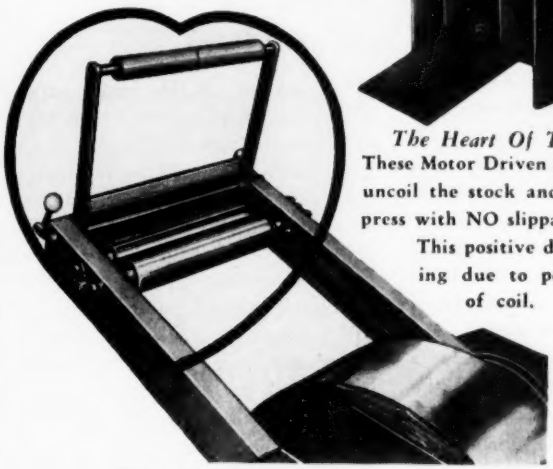

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the last word

Telltale Signs

SOMEONE has said that "property is an extension of personality." No truer statement was ever made. The clothes a man wears, the kind of house in which he lives, his automobile, his business office or workshop, his tools—in fact, everything over which he has control indicates the quality and condition of his mind. And nowhere is that statement more applicable than in the shop.

The general atmosphere of a plant indicates, to a large extent, the personality of the man at the head of it. Individual departments may—and do—reflect the personalities of the foreman directly in charge, but if the condition of the department does not also reflect the personality of the management, that foreman is in danger of being removed and replaced by one whose methods are more to the liking of the manager, and this, again, is an extension of the personality of the manager.

It is not hard for the keen observer to quickly gauge the size and condition of the mind of a foreman or other department head. Dirt invariably indicates slovenly mental processes, which is just another way of saying that it indicates an untidy, chaotic mind. Stock or tools in disarray indicates lack of system, and consequent lack of efficiency. Waste of effort and material is a natural result.

A good workman can easily be discovered by the condition of his tools. The qualities of a good foreman are reflected in the condition of his department. The ability of a good manager is evidenced by the condition of his plant, and in many cases not only the quality of his product, but also the progress of the company—or lack of it—is apparent to those who are able to read the signs.

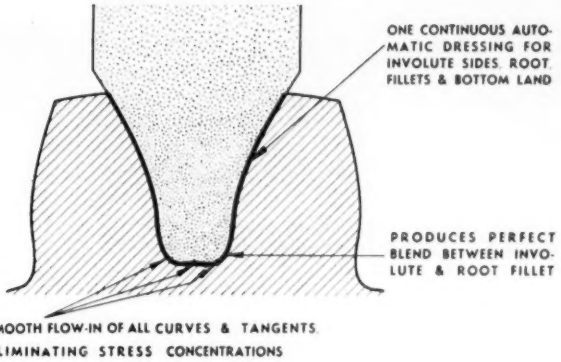
Exit 25

THE last form of this anniversary issue is just about ready to go on the press as we write these words. In a few more hours, the presses will begin to roll, printing the closing chapter of MODERN MACHINE SHOP's twenty-five eventful years.

As we turn from the past twenty-five and look confidently toward the years ahead, our hope is that you, the reader, will continue to be helped through the latest and best information presented each month and that you, the advertiser, will continue to receive excellent response from your messages.

The emphasis on modernization evident in this issue is not new to the readers of this magazine. Modernization is an enduring theme that offers a continuing challenge to everyone engaged in metalworking operations. Every month you can look to MODERN MACHINE SHOP to find ideas which will help you to do your job just a little bit better.

When Aircraft Gears Have to be Ground . . . (or other gears, splines)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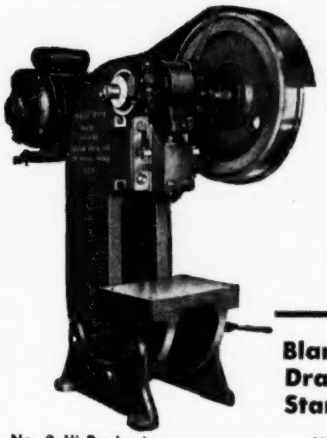

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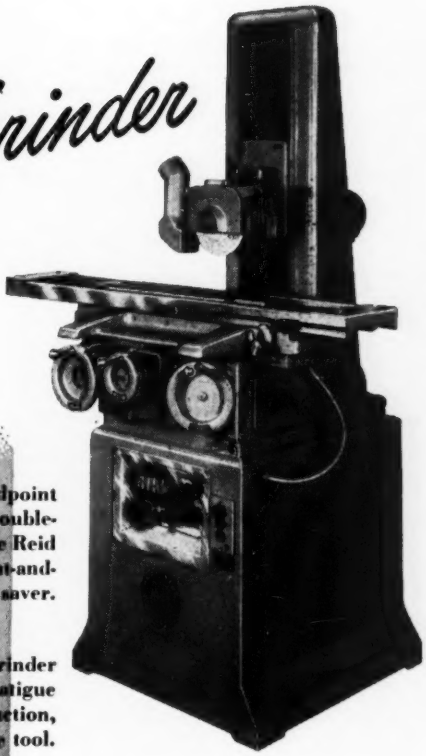

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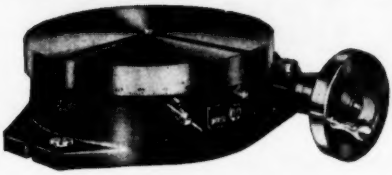
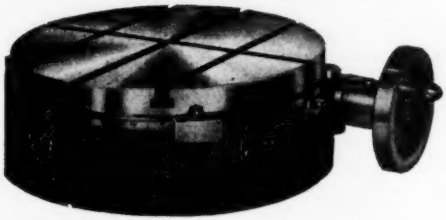


STANDARD MODELS WORM WHEEL OPERATED ROTARY TABLES

Five sizes: 9", 12", 15", 18", 21".

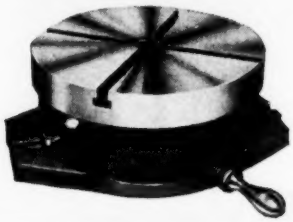
For Die Sinking, Jig Boring, Cam Milling. Indispensable in wood and metal pattern shops.



HEAVY DUTY MODELS WORM WHEEL OPERATED ROTARY TABLES

Three sizes: 18", 21", 25".

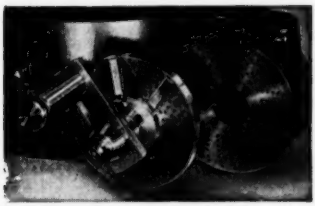
These larger, heavy duty models are used for Jig Work, Planer Jobs, and on Horizontal Boring Mills.



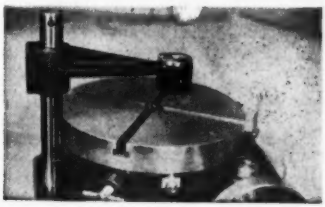
CAM LOCKING TYPE ROTARY TABLES

Three sizes: 12", 15", 18".

This model is intended for die sinking, bench work, and assembly of machine units when quick rotation and positioning are required.



Dividing Attachments can be furnished for all models of Wormwheel Operated Rotary Tables except the Model BH-9.



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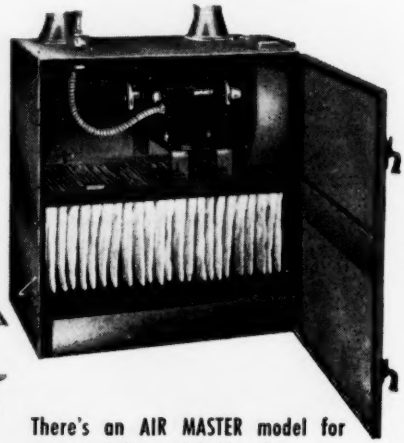
Grit is the enemy of costly machines, and of manpower, too. Put a stop to this menace with the AIR MASTER.

Trapped as they leave the wheel of your grinder or buffer, flying particles are filtered out by fabric and steel wool bags. Only grit-free air is discharged. AIR MASTER is self-contained, ruggedly built for long years of trouble-free service.



There's an AIR MASTER model for every grinder and buffer. Give your plant this protection NOW!

Write today! Ask for name of your distributor or Bulletin 53-LA.

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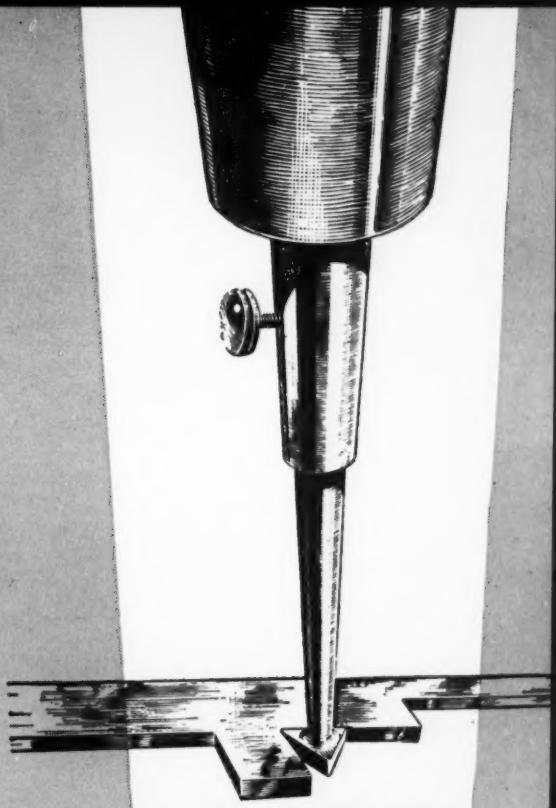
on it's 25th Anniversary
of service to metalworking



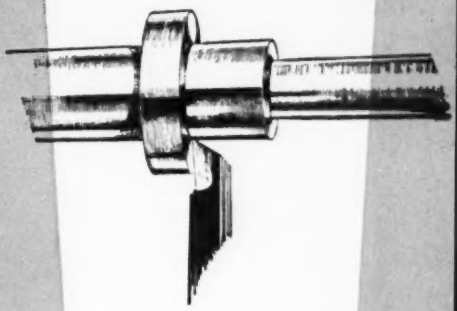
precision meets production

When precision meets production . . . the result is profits! That conclusion has been proved again and again by Lodge & Shipley Lathes.

Each type of Lodge & Shipley Lathe has many special advantages, some of them exclusive developments. They all have a common purpose, more production, greater accuracy and lower cost. They all have set notable records in American and foreign industry.

Even if your present lathes were "the last word" only a few years ago, you should investigate Lodge & Shipley's contribution to "more production through modernization."

A Lodge & Shipley representative will gladly survey your work. He'll show you, with comprehensive case histories, how Lodge & Shipley Lathes are setting production records on comparable work.



For further details
see pages 114 and 115
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THE Lodge & Shipley COMPANY
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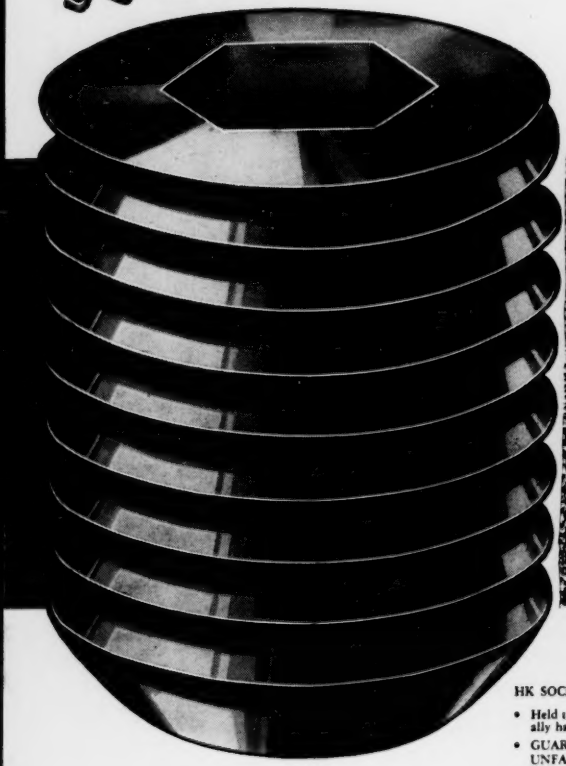
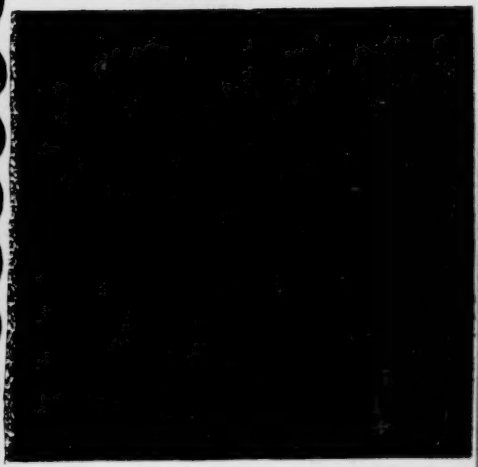


SET SCREWS



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- Quality controlled in Holo-Krome's own Physical and Chemical laboratories.

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